NEW YORK • LONDON

WORLD PETROLEUM

Texas Discovery in Major Class • Iraq and International Complications • Soviet Oil and World Commerce • Colombia's Importance in the Oil World • Underground Storage of Crude • Experts Discuss Production Engineering • Geological Air Survey

MARCH • 1931

Mexican Petroleum News and Notes

by Douglas Grahame

PRELIMINARY estimates of the Mexican Treasury Department indicate that Government revenues from petroleum production, export and import taxes during 1930 were the lowest received in recent years. According to data furnished by the Bureau of Special Taxes, the Government derived an income of only 8,745,058 pesos (about $4,372,529 U. S.) from these sources last year.

December was the poorest month of 1930 from the standpoint of petroleum taxations income, as will be seen by the following official figures.

Mexico Petroleum—in Pesos

Month	Production	Exports	Imports
January	337,808	257,954	903
February	332,736	252,598	907
March	375,878	255,537	297
April	372,696	290,492	1,113
May	540,249	345,101	841
June	596,404	387,846	4,565
July	554,736	385,439	12
August	514,522	318,399	17
September	467,754	308,702	2
October	388,667	282,396	4
November	334,348	282,736	....
December	326,333	228,049	....

The Bureau announces that it is anticipated that 1930 will prove to have been a good year in point of revenues from gasoline production and importation taxes. This hope is based upon the official returns from these sources for November which were: 1,016,028.48 pesos (about $500,008 U. S.) of which 674,665 pesos were derived from production, and 341,363.48 pesos from importation.

A PETITION urging that coal be used instead of petroleum as locomotive fuel on most of its divisions, has been sent to the management of the National Railways of Mexico by the Union of Engineers, Firemen, Conductors and Brakemen of the Second Division of the state of Coahuila. The petition has the backing of most Coahuila chambers of commerce and carries the signatures of more than 5,000 residents of that state. The petitioners argue that while oil is cheaper than coal as fuel for the railways, the use of the dry fuel will be more economical in the long run. It is contended that oil burning locomotives are short lived, but that coal burners which were put in service 25 years ago are still in use. Another argument is that the wide use of coal by the railways will tend to solve the unemployment problem by reviving the activities of the coal mines. It is also contended that using coal as fuel will keep more money in the country, and it is declared that the purchase money for oil largely benefits foreign companies, and that most of this money is sent abroad. The railways in question operate more than 11,000 miles of track which serves three-fourths of the Republic.

THE Huasteca Petroleum Co. has brought 12,750,091 liters of gasoline to Tampico from the refineries near the coast of Venezuela, for storage in Mexico in view of the overproduction in South America. The company paid about $301,000 U. S. in import duties on the consignment. It is understood that the company will make other large importations into Mexico of Venezuela refined gasoline for storage purposes.

THE national petroleum reserves in the state of Coahuila have been greatly expanded by the Ministry of Industry, Commerce and Labor, acting upon a presidential decree to that effect. As a result of the expansion, the Ministry has rejected applications for concessions to several oil land tracts in the region.

THE Mexican Eagle Oil Co. has completed 100 kilometers of the pipe line it is building from Palma Sola to Mexico City, which will be 220 kilometers long. Ten-inch welded steel pipe is being used for the entire distance. Although machinery would be cheaper, the Martin Co., contractors for the pipe line job, are employing 800 men in digging the ditch in which the pipe is laid. The hand force was employed to give the men jobs and to relieve the unemployment situation along the route of the line. Seven electrically-driven booster stations will be installed along the route.

▼

Dubbs-Standard-Shell Deal

THE Shell Union Oil Corporation and Standard Oil Company of California have acquired control of Universal Oil Products Company, a company which was created and sponsored by the late J. Ogden Armour to develop and exploit the well-known Dubbs cracking process of producing gasoline from crude oil. It is understood that under this transaction, which also involves the making of various license agreements, Mrs. Armour and her associates will receive a total of $25,000,000, payable over a period of years. Mrs. Armour has received $3,190,812 in cash, and will receive $5,025,240 in three annual installments.

The stock of the Universal Oil Products Company will go to United Gasoline Corporation, a majority of whose stock, in turn, will be owned by Standard Oil Company of California and the Shell Union Oil Corporation, and the balance of the stock will go to the old stockholders of Universal Oil Products Company. No public financing is contemplated.

The Shell group and the Standard Oil Company of California have been the largest licensees and users of the Dubbs Process. J. C. van Eck, president of Shell Union Oil Corporation, and Richard W. Hanna, vice-president of Standard Oil Company of California, stated that their companies had purchased paid-up licenses and this transaction will, therefore, relieve their respective corporations of large annual royalty payments, and that they expected that the acquisition of Universal Oil Products Company will result in a substantial benefit to the oil industry, as it is intended to license the Dubbs process broadly.

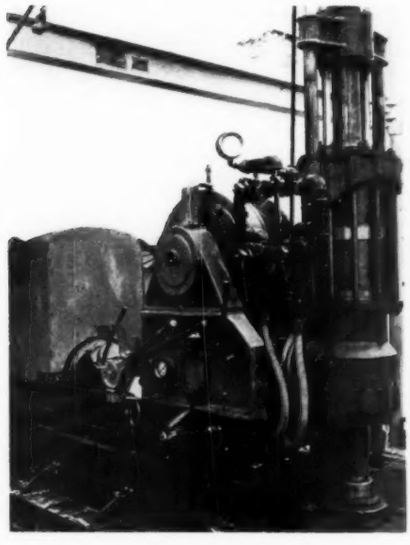
They further stated that they were firm believers in the Dubbs process and hope to acquire for it an increasing use by the industry. H. J. Halle, who accepted the presidency of Universal Oil Products Company at the instance of the late J. Ogden Armour in 1915, and to whose efforts is due, in a large measure, the success of Universal Oil Products Company, will head the newly formed United Gasoline Corporation in the capacity of president.

New Equipment and Engineering Information

Diamond Drill

A WELL in New Zealand was spudded in on April 25th of this year with a Sullivan drill, using a 25-in. bit; 22 days later 303 feet of 21½ inch casing was cemented through difficult agglomerates. Two months and nine days later 16 inch casing was cemented at 1,956 feet.

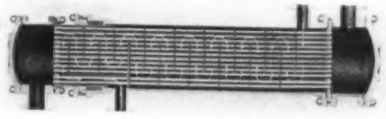
The ability of modern diamond drills to make holes as large as 25 inches in



diameter, is of interest to oil men. This is especially so as the diamond drill conbines the ability to make large holes, with the ability to drill through two more strings of casing than other equipment.

Condensate Pumps

SINGLE stage condensate pumps are announced in a new leaflet by the Westinghouse International Electric and Manufacturing Co. These pumps are used principally where low operation heads are encountered, multistage units being furnished for applications where high pumping heads prevail. They have been developed to meet the demand for efficient reliable units with low installation and operating costs, and are of the horizontal, volute, centrifugal type employing a double section impeller with opposed inlets.

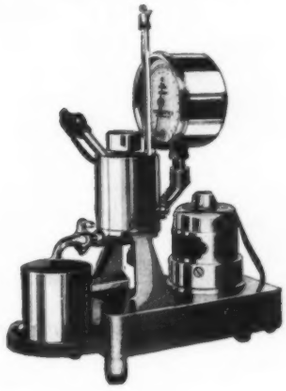


New Type Heater Exchanger

HEAT economy is a detail that is attended to in all well regulated oil refineries. The Struthers-Wells type F exchanger shown here in section has been developed with particular reference to overcoming interleakerage, which is one of the most annoying sources of trouble in heat exchanger operations. The object aimed at has been accomplished by employing no internal joints with gaskets, but an extra deep outside jacked stuffing box around guide sleeve, an improved type of split ring with solid backing ring, and a proved type of longitudinal baffle seal which prevents by-passing.

New Viscosimeter

EVERY oil refiner knows the importance of controlling the viscosity of his lubricating and engine oils. A new industrial viscosimeter is announced by the Visco-Meter Corp. In this instrument a constant pressure is employed instead of gravity to force the test liquid through the capillary tube; the viscosity readings are read directly from a gauge in Saybolt units. No stopwatch is necessary, and the viscosity of an oil product can be checked over a range from room temperature to 300° F. in a few minutes.



Crossing Boring Machine

TIME is money in laying pipe lines, and digging trenches across highways annoys the public and is expensive. The new road-crossing boring-machine put out by the Young Engine Corp. is here shown installing 300 feet of an 8″ pipe line under the Erie tracks at Jamestown, N. Y., in such a short time that the publicity agent of the company will not specify it for fear of being accused of . . . exaggeration. The cutter head on a hollow sleeve is forced forward by jacks (see figure) and rotation is imparted by a worm gear reduction. Dirt is removed through the

hollow sleeve by means of a spoon attached to a long pipe handle, or by water when available. When the hollow sleeve has advanced its full length it is unbolted, an extension joint is bolted in, and operations are resumed.

New Wrench

THAT there is room for improvement in most things, even pipe wrenches, has been shown by the Walworth Co., originators of the famous Stillson wrench which has been the standby of pipe fitters for 60 years. The Stillson is still a good wrench, but it has to have a malleable iron frame which unless carefully handled will not stand the severe treatment it often gets in an oil field.

Mexican Petroleum News and Notes

by Douglas Grahame

PRELIMINARY estimates of the Mexican Treasury Department indicate that Government revenues from petroleum production, export and import taxes during 1930 were the lowest received in recent years. According to data furnished by the Bureau of Special Taxes, the Government derived an income of only 8,745,058 pesos (about $4,372,529 U. S.) from these sources last year.

December was the poorest month of 1930 from the standpoint of petroleum taxations income, as will be seen by the following official figures.

Mexico Petroleum—in Pesos

Month	Production	Exports	Imports
January	337,808	257,954	903
February	332,736	252,598	907
March	375,878	255,537	297
April	372,696	290,492	1,113
May	540,249	345,101	841
June	596,404	387,846	4,565
July	554,736	385,439	12
August	514,522	318,399	17
September	467,754	308,702	2
October	388,667	282,396	4
November	334,348	282,736	....
December	326,333	228,049	....

The Bureau announces that it is anticipated that 1930 will prove to have been a good year in point of revenues from gasoline production and importation taxes. This hope is based upon the official returns from these sources for November which were: 1,016,028.48 pesos (about $500,008 U. S.) of which 674,665 pesos were derived from production, and 341,363.48 pesos from importation.

A PETITION urging that coal be used instead of petroleum as locomotive fuel on most of its divisions, has been sent to the management of the National Railways of Mexico by the Union of Engineers, Firemen, Conductors and Brakemen of the Second Division of the state of Coahuila. The petition has the backing of most Coahuila chambers of commerce and carries the signatures of more than 5,000 residents of that state. The petitioners argue that while oil is cheaper than coal as fuel for the railways, the use of the dry fuel will be more economical in the long run. It is contended that oil burning locomotives are short lived, but that coal burners which were put in service 25 years ago are still in use. Another argument is that the wide use of coal by the railways will tend to solve the unemployment problem by reviving the activities of the coal mines. It is also contended that using coal as fuel will keep more money in the country, and it is declared that the purchase money for oil largely benefits foreign companies, and that most of this money is sent abroad. The railways in question operate more than 11,000 miles of track which serves three-fourths of the Republic.

THE Huasteca Petroleum Co. has brought 12,750,091 liters of gasoline to Tampico from the refineries near the coast of Venezuela, for storage in Mexico in view of the overproduction in South America. The company paid about $301,000 U. S. in import duties on the consignment. It is understood that the company will make other large importations into Mexico of Venezuela refined gasoline for storage purposes.

THE national petroleum reserves in the state of Coahuila have been greatly expanded by the Ministry of Industry, Commerce and Labor, acting upon a presidential decree to that effect. As a result of the expansion, the Ministry has rejected applications for concessions to several oil land tracts in the region.

THE Mexican Eagle Oil Co. has completed 100 kilometers of the pipe line it is building from Palma Sola to Mexico City, which will be 220 kilometers long. Ten-inch welded steel pipe is being used for the entire distance. Although machinery would be cheaper, the Martin Co., contractors for the pipe line job, are employing 800 men in digging the ditch in which the pipe is laid. The hand force was employed to give the men jobs and to relieve the unemployment situation along the route of the line. Seven electrically-driven booster stations will be installed along the route.

Dubbs-Standard-Shell Deal

THE Shell Union Oil Corporation and Standard Oil Company of California have acquired control of Universal Oil Products Company, a company which was created and sponsored by the late J. Ogden Armour to develop and exploit the well-known Dubbs cracking process of producing gasoline from crude oil. It is understood that under this transaction, which also involves the making of various license agreements, Mrs. Armour and her associates will receive a total of $25,000,000, payable over a period of years. Mrs. Armour has received $3,190,812 in cash, and will receive $5,025,240 in three annual installments.

The stock of the Universal Oil Products Company will go to United Gasoline Corporation, a majority of whose stock, in turn, will be owned by Standard Oil Company of California and the Shell Union Oil Corporation, and the balance of the stock will go to the old stockholders of Universal Oil Products Company. No public financing is contemplated.

The Shell group and the Standard Oil Company of California have been the largest licensees and users of the Dubbs Process. J. C. van Eck, president of Shell Union Oil Corporation, and Richard W. Hanna, vice-president of Standard Oil Company of California, stated that their companies had purchased paid-up licenses and this transaction will, therefore, relieve their respective corporations of large annual royalty payments, and that they expected that the acquisition of Universal Oil Products Company will result in a substantial benefit to the oil industry, as it is intended to license the Dubbs process broadly.

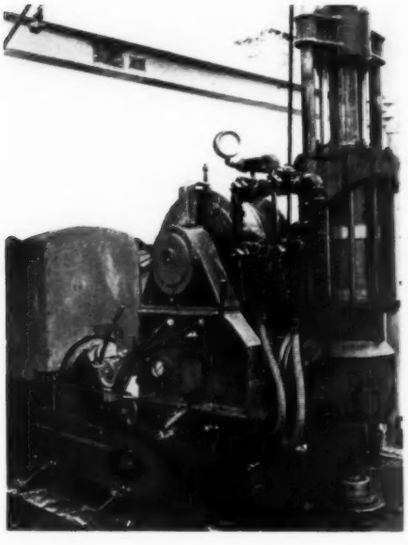
They further stated that they were firm believers in the Dubbs process and hope to acquire for it an increasing use by the industry. H. J. Halle, who accepted the presidency of Universal Oil Products Company at the instance of the late J. Ogden Armour in 1915, and to whose efforts is due, in a large measure, the success of Universal Oil Products Company, will head the newly formed United Gasoline Corporation in the capacity of president.

New Equipment and Engineering Information

Diamond Drill

A WELL in New Zealand was spudded in on April 25th of this year with a Sullivan drill, using a 25-in. bit; 22 days later 303 feet of 21½ inch casing was cemented through difficult agglomerates. Two months and nine days later 16 inch casing was cemented at 1,956 feet.

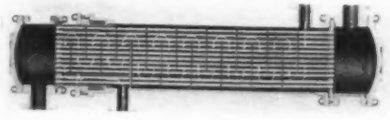
The ability of modern diamond drills to make holes as large as 25 inches in



diameter, is of interest to oil men. This is especially so as the diamond drill conbines the ability to make large holes, with the ability to drill through two more strings of casing than other equipment.

Condensate Pumps

SINGLE stage condensate pumps are announced in a new leaflet by the Westinghouse International Electric and Manufacturing Co. These pumps are used principally where low operation heads are encountered, multistage units being furnished for applications where high pumping heads prevail. They have been developed to meet the demand for efficient reliable units with low installation and operating costs, and are of the horizontal, volute, centrifugal type employing a double section impeller with opposed inlets.



New Type Heater Exchanger

HEAT economy is a detail that is attended to in all well regulated oil refineries. The Struthers-Wells type F exchanger shown here in section has been developed with particular reference to overcoming interleakerage, which is one of the most annoying sources of trouble in heat exchanger operations. The object aimed at has been accomplished by employing no internal joints with gaskets, but an extra deep outside jacked stuffing box around guide sleeve, an improved type of split ring with solid backing ring, and a proved type of longitudinal baffle seal which prevents by-passing.

New Viscosimeter

EVERY oil refiner knows the importance of controlling the viscosity of his lubricating and engine oils. A new industrial viscosimeter is announced by the Visco-Meter Corp. In this instrument a constant pressure is employed instead of gravity to force the test liquid through the capillary tube; the viscosity readings are read directly from a gauge in Saybolt units. No stopwatch is necessary, and the viscosity of an oil product can be checked over a range from room temperature to 300° F. in a few minutes.

Crossing Boring Machine

TIME is money in laying pipe lines, and digging trenches across highways annoys the public and is expensive. The new road-crossing boring-machine put out by the Young Engine Corp. is here shown installing 300 feet of an 8" pipe line under the Erie tracks at Jamestown, N. Y., in such a short time that the publicity agent of the company will not specify it for fear of being accused of . . . exaggeration. The cutter head on a hollow sleeve is forced forward by jacks (see figure) and rotation is imparted by a worm gear reduction. Dirt is removed through the

hollow sleeve by means of a spoon attached to a long pipe handle, or by water when available. When the hollow sleeve has advanced its full length it is unbolted, an extension joint is bolted in, and operations are resumed.

New Wrench

THAT there is room for improvement in most things, even pipe wrenches, has been shown by the Walworth Co., originators of the famous Stillson wrench which has been the standby of pipe fitters for 60 years. The Stillson is still a good wrench, but it has to have a malleable iron frame which unless carefully handled will not stand the severe treatment it often gets in an oil field.

New drop forge machinery preferred by Walworth makes it possible to forge the bar or handle integral with the frame, giving maximum strength to the nut housing.

Mapping Crooked Wells

CROOKED oil wells are always sources of annoyance and loss. How to rectify a crooked hole is a matter of finding what kind of kinks it has and where they are. Several ways of determining the orientation of an oil well have been devised. Among the most useful of these is the Surwell Gyroscopic Clinograph, which consists of the three units shown in the accompanying illustration; one is a gyroscope, with a small motor, another is a camera, and the third is a box-level gauge. The three are placed one behind the other in a special tube and lowered into the well suspected of crookedness. The gyroscope controls a pointer which always points in a north and south direction; the box-level gauge has a bubble indicator and a scale which shows deviations from the vertical; the function of the cameras is to take a moving picture of the compass and the level indicator as the outfit is lowered into the hole, and at the same time it photographs the face of a watch so that the exact position of the instrument at any moment can be calculated. The result is a record from which the course of the well can be accurately plotted.

For most purposes of well drilling, an instrument that registers only departures from the vertical will suffice. An improved instrument for this purpose is

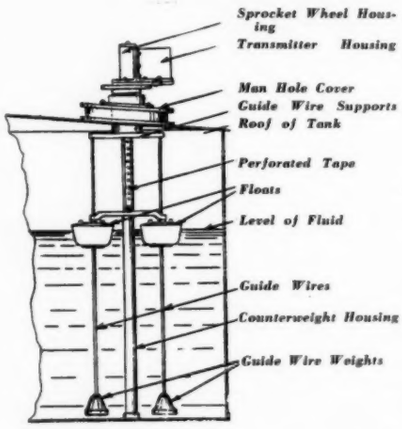
the Syfo Clinograph. Both are made by the Sperry-Sun Well Surveying Company.

▼

Gauging Fluid Levels

THE introduction of the MacCready fluid level indicator, a simple, scientific remote control for indicating the fluid levels of reservoirs or storage tanks,

with special reference to the oil industry, is announced by J. H. Bunnel and Co. From an instrument panel set



up in the pump station, which may be miles distant from the tank farm, it is possible to take readings of the fluid levels in as many tanks as may be necessary, and within an accuracy of one eighth of an inch. The principle of the apparatus is shown in the accompanying diagram; special floats in the tank move a perforated tape connected to an electrical transmitter, which in turn sends an impulse to the distant indicator, the dial of which at all times shows the level of the fluid in the tank. This does away with cumbersome and slow hand gauging.

▼

Manufacturers' Publications

New House Organ

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA, Los Angeles, Calif., have begun the free issue of a house organ under the title, "The Electric Dehydrator," in four pages and two colors. It will provide information on electric dehydration of oils and the "cut oil" problem in general.

Swivels

The National Supply Co., Toledo, O., have out a new bulletin, 50A, describing new types of swivels for oil rigs.

Gas Lines

A New Way of Designing and Building Gas Lines with Smithwelded Pipe, is the title of Bulletin No. 510, issued by the A. O. Smith Corporation, Milwaukee. This is less a manufacturer's advertisement than a practical and useful treatise on the cost of building long gas lines. It contains much important engineering data, and many descriptions and illustrations of actual jobs.

Gas Distributor

Bulletin 1230 of the National Supply Co. describes a new electrically operated timing device of advanced design, chiefly for use with Oilift displacement pumps. These are made in units which may be built up to control a large number of wells.

Reda Oil Well Pump

Reda Pump Co., Bartlesville, Okla., are now issuing their pamphlet No. 1 introducing the Reda pump unit, which is described as the only electrical oil pump with both the motor and the pump in a single unit at the bottom of the well.

Correction

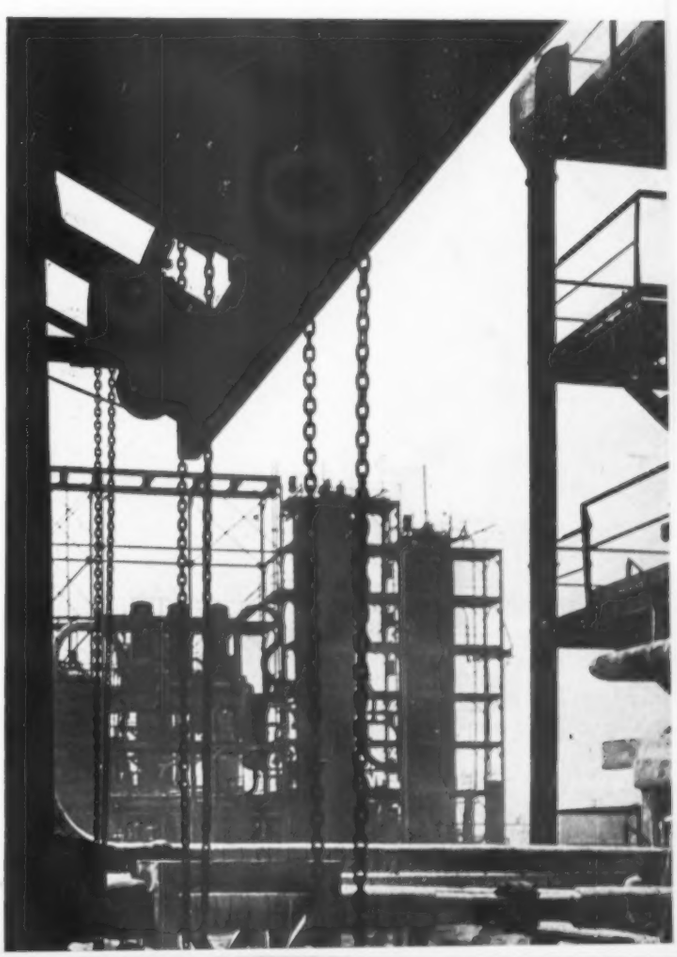
On page 60 of the January issue of WORLD PETROLEUM it was erroneously stated that the Speeder trench pull shovel is made by the Bartlett-Osterhout Company, whereas it is made by the Speeder Machinery Corp.

DR. O. W. WILLCOX.

NEW YORK • LONDON

WORLD PETROLEUM

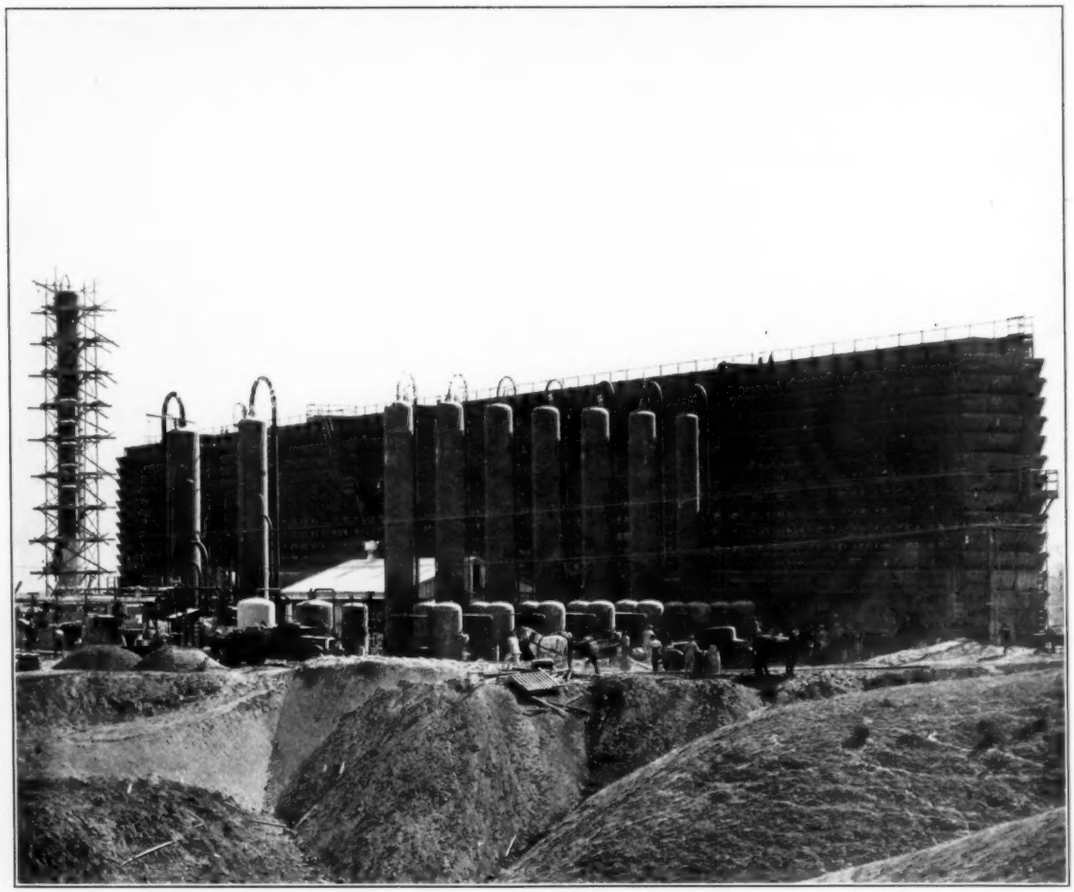
Texas Discovery in Major Class • Iraq and International Complications • Soviet Oil and World Commerce • Colombia's Importance in the Oil World • Underground Storage of Crude • Experts Discuss Production Engineering • Geological Air Survey



MARCH • 1931

FIFTY CENTS OR TWO SHILLINGS THE COPY

Braun
FIELD SERVICE



In 45 days after verbal order this 130,000 gallons of gasoline per day absorption and stabilization plant was designed, manufactured, and erected . . . all by our own organization.

Complete field surveys, sampling and fractional analysis of gas, and recommendations for gasoline recovery are also made by us wholly with our own facilities and technicians.

C. F. BRAUN & CO. INC.

ALHAMBRA • NEW YORK • TULSA • HOUSTON

MARCH
1931
WORLD PETROLEUM

Executive-Editor, T. Orchard Lisle

VOLUME II NUMBER 3

CONTENTS

Frontispiece 212
Editorial 213
Production 247
Finance 249
Foreign Legion Oil..... 253
Shipping 254
Equipment Notes 255

Special Articles

TITLE	AUTHOR	PAGE
Iraq Oil and International Complications	The Editor	214
Soviet Oil and World Commerce	J. Wegrin	215
Dutch Problems in the West Indies	Amry Vandenbosch	216
Colombia's Importance in the Oil World		217
Texas Discovery of Major Importance	E. Deane and B. Zavoico	224
Geological Survey from the Air	Dr. Theo. A. Link	229
Petroleum Distribution in Great Britain	A. H. Day	235
Underground Storage of Crude Oil		239
The A. I. M. M. E. Petroleum Meeting	Basil B. Zavoico	241
Salt Domes of Germany		243

PUBLISHED MONTHLY

by RUSSELL PALMER

153 Waverly Place, New York, U. S. A.

Telephone: SPring 7—7398

Cable Address: Ruspam, New York

Managing-Director, T. Orchard Lisle

Advertising Manager, H. D. Allen

▼

Great Britain
110 Fenchurch St., E. C. 3, London
European Director, A. C. Hardy
Telephone: Mon. 3310
Cable Address, Ruspam, London

California
Bendix Building, Los Angeles
Manager, F. S. Norman
Telephone: Westmore 9191
Cable Address, RUSPAM, Los Angeles

Subscriptions

ANNUAL subscription to WORLD PETROLEUM is offered at the flat rate of five dollars (U. S.) postpaid to any country in the International Postal Union.

For the convenience of subscribers the publishers will accept payment in any of the following currencies at the fixed rate shown below:

Argentine	14 paper dollars
Columbia	5.25 peso (gold)
France	130 francs
Germany	21 Reichsmark
Great Britain	One guinea
Holland	12,50 gulden
India	14 rupees
Japan	10,50 yen
Mexico	10,50 peso (gold)
Peru	1,25 libra
Poland	45 zloty
Rumania	835 lei
Russia	1 chervonetz
Venezuela	25 bolivar

Remittances or drafts to the order of the Publisher, WORLD PETROLEUM, payable in New York or London.

Subscriber's name and address should be in Roman capitals on the subscription order.

Official position of subscriber is requested.

Advance notice, if possible, of a change of subscriber's address should be given. Effect cannot be given at once to a change of address. The period of transmission of the subscriber's instructions through the mail extends the time required before the magazine can be mailed to the new address.

▼

Agencies

SINGLE copies of WORLD PETROLEUM are obtainable every month, within the delay imposed by the international mail service, at any of the following agencies:

BUCHAREST—Cartea Romaneasca, Bulevardul Academiei 3
CABIMAS, VENEZUELA—The German Store
CALGARY—D. J. Young & Co., Ltd., 214a—8th Ave., West
CARACAS, VENEZUELA—Casa Letcher, Torres a Madrices 22
CURACAO, D. W. I.—The Book Store Sluyter
THE HAGUE—Martinus Nijhoff, Lange Voorhout 9
LONDON—World Petroleum, 110 Fenchurch Street, E. C. 3
MARACAIBO—Maracaibo Supply Co.
MARACAIBO, VENEZUELA—The Blue Book
MELBOURNE—Gordon & Gotch, Ltd.
MENE GRANDE, MARACAIBO, VENEZUELA—M. S. Sequeraj
MOSCOW—Mezhdunarodnaja Kniga, Kusnetski Most 18
NEW YORK—Newsstand, Woolworth Building; I. Levine, Corner Wall and Rector Streets.
PARIS—Librairie Brentano, 37 Avenue de l'Opéra
PORT OF SPAIN—Davidson & Todd, Ltd., 8 Frederick St.
RANGOON—British Burma Press, 48-31 Sparks St.
TAMPICO—La Sonora, S. A., 25 Comercio Oriente
SOERABAYA—Het Boekhuis, Societeitstraat 4
WARSAW—Bibljoteka Polska, Nowy Swiat 22

The price of a single copy is 50 cents in Canada, 2 shillings in other countries of the British Commonwealth and the equivalent of 50 cents (U. S.) elsewhere.

▼

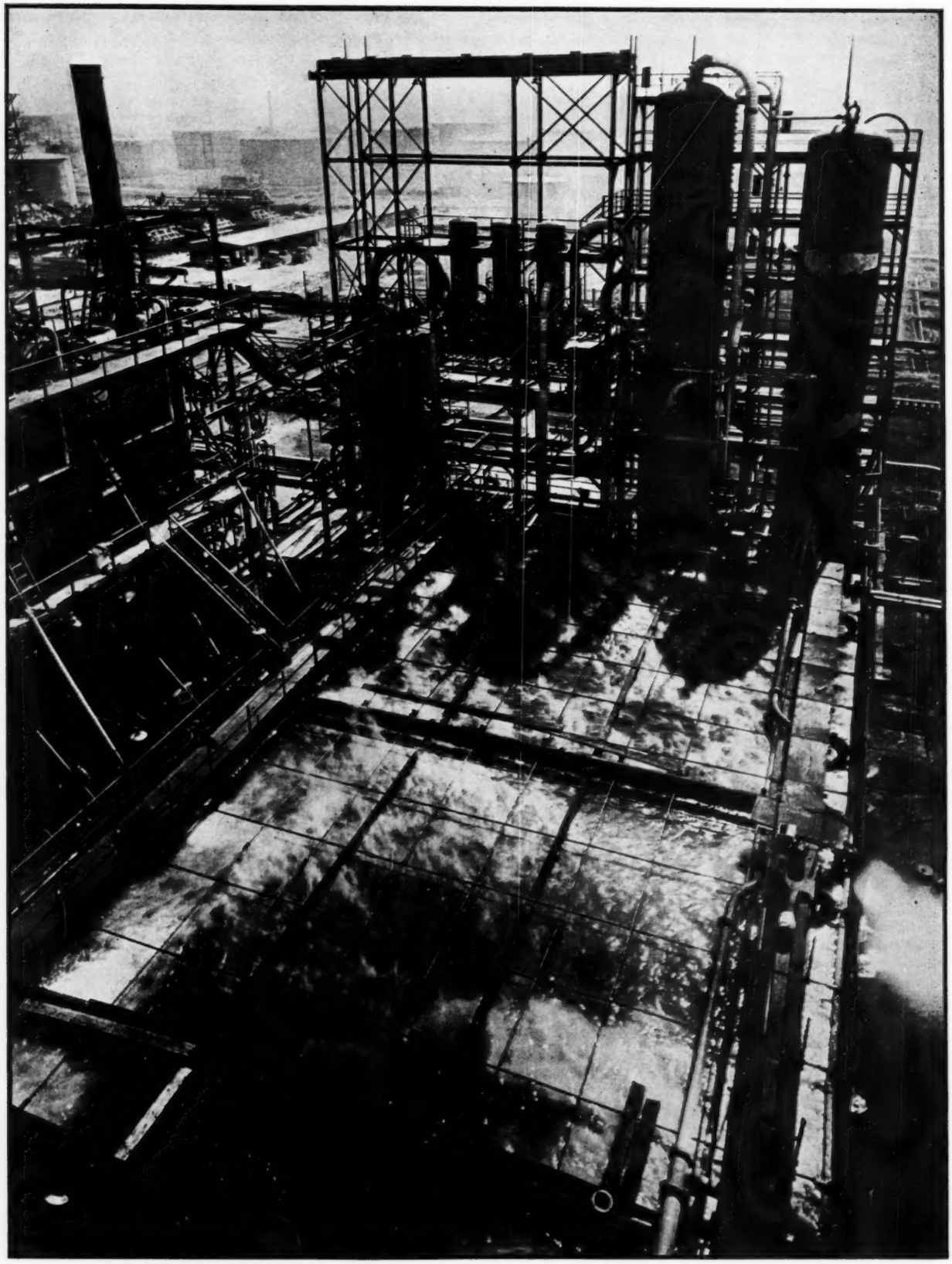
Particular Notices

CONTENTS of WORLD PETROLEUM are copyrighted by Russell Palmer, and contents may not be reproduced without permission.

Manuscripts and photographs submitted to the Editor are received only at the owner's risk. Prompt consideration will be given to them.

The Publisher does not necessarily endorse the views expressed by authors of signed articles. In the service of readers he will not hesitate to give publication to signed opinions in direct opposition to his own.

Advertising rates are scheduled in Standard Rate and Data. Copies of the schedule can be obtained on request to the Advertising Manager, 153 Waverly Place, New York, N. Y., or to 110 Fenchurch St., London, or to Bendix Bld., Los Angeles, Cal.



Cracking Unit at Bayway Refinery. Courtesy, Standard Oil of N. J.

NEW YORK • WORLD • LONDON

PETROLEUM

ONE of the difficulties confronting oil conservation in the United States is the discovery and development of new fields. This and other forms of obstacles have continuously arisen since initial endeavors to keep down production somewhere near the point of demand were made. At one period Kettleman Hills looked like disturbing the situation, and now another difficulty of major seriousness has arisen threatening to undermine all successful progress to date. This cause for A. P. I. concern is the new Rusk-Gregg pool in Texas, discovered at the close of last year, and which lately has aroused the entire local countryside to a fever pitch. One lucky wildcatter —a driller—was paid $2,000,000 for his well by Jersey Standard interests. Hundreds of others aim to become millionaires over night, although a very low price per barrel has been posted.

New Texas Field

Situated but 225 miles from the Gulf oil port of Port Arthur, fed by many railroad lines, and within a few miles of the new Humble 10-inch pipeline, the pool is ideally located for a boom. Already seven wells are producing, including one of 22,000 barrels per day plus 5,000,000 feet of gas, and over sixty wildcats are being drilled, aside from six in the adjoining county. Hundreds of wells within a short period may be flowing, unless restrictions are effected.

It produces little surprise, therefore, when Chairman Robert R. Penn of the Division of Production of the A. P. I. pleads that the further he proceeds with curtailment work, the more he feels the impotency of all the established powers now existing. "There should be ways," says Mr. Penn, "to curtail drilling more effectively, to curtail production, to curtail refining, to control withdrawals from stock, and to control importations; but I cannot say specifically how it can be done." In the latter remark Mr. Penn puts his finger on the crux of the situation.

What is possible and how it can be effectively accomplished without government aid are no easy questions for the industry to answer. Whatever plans are proposed must be effective throughout the country—not merely in single pools or even in individual States, although such motions are steps en route to the ultimate goal. Curtailment to be satisfactory must form one vast chain without a single defective link. Few oil men desire to see Federal legislation enacted, except as a desperate resort, as they see the danger of the cure being worse than the disease.

One suggestion put forward is the formation of "five-year pool trusts" in all oil districts, operating the fields under the unit plan, all local trusts to be governed by a National Trust, which also is to control an "import trust" that will hold imports in proportion to domestic production. Perhaps such administration would have the desired curtailment result; but just how to induce both the big producers and the thousands of independents to agree voluntarily to hand over their properties and rights to the Trusts remains to be answered. The Government might even consider it a violation of the law. Meanwhile the immediate problem is starting unit operation in the new field before it runs wild and beyond control, especially as it may prove the most prolific field in the country.

▼

ONE of the most constructive of recent developments in the petroleum world is described elsewhere in this issue of WORLD PETROLEUM. We refer to the storage in semi-depleted fields of crude oil and gas from over-producing pools. Sufficient progress has been made in California and Persia to warrant more extensive adoption in other fields in the interests of both conservation and better price structures for crudes today. The way for at least a partial solution for overproduction problems is opened, particularly in the United States. By its adoption, where practical, thousands of small, independent producers could continue with their output, selling the oil and gas to larger companies or to a special organization formed for the purpose. Many existing pipelines could be utilized for pumping the crude and gas to nearby and distant oil fields that are now virtually completed. There it could be stored in nature's subterranean tanks for years if desired. Complete control of the storage fields and purchases of crude might have to come under one head in order to ensure maintenance of pressure in the oil sands, as well as for price purposes, and for stopping drilling and production in the storage field. Numerous technical and administration details would have to be worked out by the industry, before widespread adoption could be attained.

Underground Storage

Iraq Oil and International Complications

France and the B. O. D. Appear to be Forcing Hand of Iraq Petroleum Company. International Political Situation May Develop to Serious Point.

By the Editor

ASIDE from the future commercial importance of Iraq oil and its probable influence on world markets, a political situation—international in character and critical in nature—may develop in the immediate or near future. Iraq oil, with its enormous potential supply, if released on top of the increasing flow from Russia, Persia, Roumania, the United States, the Dutch East Indies and the Carribbean before world consumption has substantially increased, will materially change the international oil map already threatened with disarrangement.

France is actively seeking an adequate supply of crude that will be at least partly under her own control in order to establish a domestic refining industry. Naturally she is more interested in accomplishing this primary object than in preventing oversupplies in other countries. She wants the crude now and is impatient of any plan that requires waiting five or seven years. She is putting forth strenuous efforts to open the gates now shutting Iraq from the sea, and cannot reconcile herself to the delay for which she claims that Sir John Cadman, chairman, Iraq Petroleum Company, appears to be largely responsible. As soon as internal political affairs in France are smoothed out even greater pressure is likely to be put behind the present Iraq movement.

Apart from the 23¾ per cent interest in the Iraq Petroleum Company held by Anglo-Persian (of which Sir John is also chairman) the company will receive 10 per cent of all Iraq crude; it has its own producing field and operating subsidiary in the "Transferred Territory" between Iraq and Persia as well as its great producing fields in Persia. Were there an undersupply of crude in the world, Anglo-Persian would be ideally situated if the pipeline from Iraq to the Mediterranean was under construction, because its present Persian production could be increased and diverted to African, Indian, Australian and Far Eastern markets. Furthermore, unless it proved too costly, a chain of pipe connections could be made from the Persian fields over the mountains via the "Transferred Territory" to the Iraq line and thence to the Mediterranean, and so shorten the tankship service to Great Britain, Germany, Scandinavia, and other western European countries. In addition Suez Canal tolls would be saved. Faced with heavy international competition today it is very doubtful if Anglo-Persian's markets in countries south and east of the canal have been sufficiently developed to absorb the growing Persian output, which now exceeds 43,000,000 bbl. per year.

The Iraq Petroleum Company is in negotiation with the Iraqi government for a modification of the terms of the existing concession convention. Its position is that the conditions of its concession are perfectly clear, and that it has more than fulfilled requirements. Had the Iraqi government demanded a modification of the concession on the grounds of non-fulfillment, the Company's attitude in fighting for its rights would be perfectly understandable. As it is the influence of some other factor is indicated.

Obviously the company's hand has been forced by the action of the British Oil Development Company, forty per cent of whose stock is owned by the Azienda Generale Italiana Petroli, bringing Italy into the picture. Taking advantage of France's determination to wait no longer for Iraq oil and of King Faisal's desire to secure revenues from his country's vast stores of crude, the B. O. D., seeks to persuade the Iraqi government to grant a concession on the grounds that Iraq Petroleum has failed to carry out its obligations, and that its policy is not consistent with the immediate development of the oil fields. The B. O. D. has carried its appeal to the Permanent Mandates Commission of the League of Nations, maintaining that the present negotiations by Iraq Petroleum with the Iraqi government are improper. The Government, however, does not agree with the B. O. D.'s contention, nor that the time limit granted to the I. P. should not have been extended.

The original concession, as previously outlined in WORLD PETROLEUM, prevents the application for concessions of other oil companies until plots in Iraq not selected by Iraq Petroleum are put up for auction. In November, 1929, Iraq Petroleum selected its plots for development, but did so under protest. The Iraqi government in carrying out the present negotiations hopes to secure accelerated development.

The British government, which is the Mandatory Power, and which has a direct interest through its 50 per cent ownership of the Anglo-Persian Oil Company, made it clear to the Permanent Mandate Commission that it is naturally anxious to hasten development of the Iraqi oil fields, but considers it best to leave matters to the Iraqi government and to Iraq Petroleum. Furthermore the British government also is endeavoring to avoid participating in discussions on the pipeline route. Meanwhile the survey of the pipeline to both Tripoli and Haifa has been completed. As first published in WORLD PETROLEUM, the pipeline will go to both ports, and the contract to start the line will be carried out immediately the agreement between Iraq Petroleum and the Iraqi government is signed.

On the matter of claims of the B. O. D., the British government has frankly stated to the Mandates Commission that it believes the statements of Iraq Petroleum and not the claims of the B. O. D., and regards it as the Iraq Petroleum's desire to develop the fields as soon as possible. The Government points out that the Company has already spent $17,500,000 in Iraq.

The conclusion of the Permanent Mandates Commission of the League of Nations is that it is necessary for the B. O. D. to show that they have suffered definite injury, and to prove for what injury reparation is demanded, otherwise the petition should be dismissed. The Permanent Mandates Commission cannot examine the petition from the B. O. D., so long as the legal remedy is still open to them.

Soviet Oil and the World's Markets

Can the Menace of Russian Petroleum to Present Oil Marketing be Alleviated by an International Understanding Similiar to Plan Now Operating in Great Britain. . . . By J. Wegrin

RUSSIA is now producing 12 million bbl. of crude oil per month. From the 14 million bbl. of petroleum exported by Soviet Russia in 1927, there was a jump to over 37 million bbl. last year. It may be 50 million in 1931! Russian oil is being exported, and it is also being bought and paid for. As plenty of purchasers seem available the future outlook is not without the possibility of a world crisis developing in the oil industry from the present unsettled state unless some constructive understanding is reached before the Soviet five-year program reaches maturity.

The January and February issues of WORLD PETROLEUM gave exclusive details of the tremendously expanded oil program that Soviet Russia has just undertaken, and also of the efforts being made to build up huge refining centers at the Black Sea ports of Batoum and Touapse, which are the export outlets for Russian oil. From Russian semi-official sources I have extracted the following data showing the growth of operations of Russia's oil industry for the last four fiscal years. (Fisc. year = 12 months ending Sept. 30.)

The annual average increases of both internal consumption and exports are about equal, and vary between 19 and 25 per cent over the previous year for the last four years. There is a continuity of growth, which is being planned for years in advance. The plans are so elaborate that even when they fail in a number of particulars they still produce important results of world effect.

The production quota for 1931 calls for 177,500,000 bbl. of crude oil, and this quantity is to be almost doubled in 1933, which is the last year under the five-year industrialization plan. Russia's refining capacity will amount to 185,000,000 bbl. at the end of this year. The country is rapidly being industrialized, and, therefore, the Soviet petroleum trusts have to meet the ever growing demand of the internal markets. At the same time Russia obviously is determined to make her oil flow to the markets of the world in increasing quantities. Oil is one of the most outstanding export surplus balances instrumental to carry through her industrialization.

Growth of Russia's Oil Industry

Year	Production	Refining	Dom. Consumpt.	Export	Cap. Invest.
	(In millions of Bbls.—7 bbl. per Ton)				(Mil. Roubles)
1926/27	71.4	55.6	41.3	14.2	174
1927/28	82.6	61.6	46.6	18.9	201
1928/29	95.9	81.9	53.2	25.3	215
1929/30	124.2	103.9	69.8	32.2	305

NEARLY two years ago Russian competition with Great Britain caused serious slashes in motor spirit prices. Market balance was only secured when an agreement was made by the leading oil companies, including Shell, whereby the Soviets were given a quota of approximately 3,000,000 bbl. of petroleum products. Since then France has increased her Soviet fuel-oil imports by 50 per cent. Will Russia limit her output and export sales in accordance with curtailment programs of other countries, and thus assist world stabilization if international oil companies enter into a similar understanding? The writer suggests that much of the ill effects on the rest of the world's petroleum trade could be greatly alleviated by an international marketing agreement.

It consequently is of very great importance for international oil interests to know if Russia's enormous petroleum program will prove a menace, or if harmonious marketing conditions will prevail should oil organizations having world-wide business arrange some form of trade understanding. It may take Russia some time to complete so enormous a program, this largely depending upon the efficiency of the production and refining plans now under way. According to Russian sources of information quoted elsewhere in this issue, it must be admitted that there are shortcomings and delays greatly handicapping rapid expansion. On the other hand the program is so formidable that it can fall down in a number of particulars without minimizing the general results.

No executive who is a student of world trade in petroleum will ignore the fact that Russia has already made colossal strides towards progress of her petroleum industry. He must necessarily bear in mind that her supplies are situated very favorably in relation to European and Far Eastern markets.

Russia has solved the major difficulties of her own oil industry, while the oil industries in all other countries are facing a possible lengthy period of depression, with conditions likely to jump from bad to worse. Right or wrong in her policy, the fact remains that under the same, Russia has abolished internal competition, achieved unit control, has no duplication of operating organizations, and consequently no competitive drainage of wells, and today has no problem of overproduction. Russia has no prohibitive royalties to pay to owners, no bonuses to individuals, nor any profits to holding companies, no dividends to stockholders and no high remuneration to the management. This condition places the Soviets in a position to meet any price competition from any or every

(Continued on page 238)

Dutch Problems in the West Indies

Because of the Importance of the Caribbean In World Petroleum Affairs We Publish an Extract of Professor Amry Vandenbosch's Article from January "Foreign Affairs". . . .

A PECULIAR economic and international situation exists in the islands of Curacao and Aruba, two of the three Dutch West Indies lying off the coast of Venezuela. During the last few years these two islands have enjoyed a period of great prosperity, induced by the oil boom in Venezuela. The Gulf of Maracaibo, about whose shores the Venezuelan petroleum industry has developed, is too shallow for deep ocean-going vessels, with the result that the petroleum is shipped over to the Dutch islands, where it is refined and shipped. Besides good harbors, these near-by islands have the advantages of a stable government and a comparatively large and efficient laboring population; this has made them not only a great refining and export center, but also a fueling station for the numerous oil-burning ships traveling between the Americas.

In practically all the years of Dutch rule previous to 1923 Curacao was a drain on the treasury of the mother country. However, for 1929 the income of the Curacao Government was 120 per cent more than it had been five years before, nearly 187 per cent more than it had been ten years before, and almost 540 per cent more than it had been fifteen years before. The budget has in recent years enjoyed an actual surplus. Imports have increased about thirty times in the last fifteen years. Curacao has become the center of one of the largest petroleum industries of the world, and the tonnage of its shipping has surpassed that of Amsterdam.

The Dutch are wondering whether this prosperity is of a passing or a permanent nature. The islands have had short periods of prosperity before, only to lapse again into long periods of depression. They flourished as a smuggling center and as a slave-trading center in the days of the monopolistic Spanish colonial commercial policy, and during the American Civil War they enjoyed a short period of prosperity from the blockade runners. The present prosperity would seem to have a better and more permanent basis, but its weakness is still that the oil on which it is based comes not from Dutch soil, but from without.

It is a question whether Venezuela will always be satisfied for Curacao and Aruba to be the refining centers and ports of export of Venezuelan oil. The Dutch also entertain some misgivings regarding the expansion of the United States in the Caribbean. The Dutch West Indies colony is composed of the three islands near the Venezuelan coast and also three smaller ones 500 miles to the northeast—St. Martin (half of which belongs to France), St. Eustatius and Saba. This northern island group constitutes the connecting link between the Greater and the Lesser Antilles, and in some quarters it is felt that, as the United States found it desirable to acquire possession of the Virgin Islands (which lie only 100 miles from St. Martin), so it may ultimately desire the Dutch West Indies for the protection of the Panama Canal. The recent difficulties of the Standard Oil Company in obtaining concessions in Aruba led the Chicago TRIBUNE to declare that the possession of territory in the Americas by a non-American power was an anomaly; this statement caused no little consternation in Holland.

No less difficult are the governmental problems which the Netherlands faces in ruling these isolated colonial communities. Although the two small island groups have entirely different interests, they constitute a single colonial unit under Netherlands sovereignty. The total population of the three northern islands is less than 5,000, while the population of the southern group approaches 100,000, of which 75,000 live in Curacao. The northern group is agricultural, the southern group industrial; and while the southern group has come into an era of prosperity, the northern group is suffering a severe economic depression. The population of the northern islands has been decreasing for some time.

The government of Curacao (the name applied to the two groups of islands jointly) is composed of a Governor, appointed by the Netherlands government, and a Colonial Council of thirteen members. The Council is cooperative in nature; whenever a vacancy occurs in the membership the Council itself recommends two names, from which the Crown selects one. The seat of government is at Willemstadt, on the island of Curacao. Because of the small population of the northern group and its distance from the capital, practically all of the members of the Council are inhabitants of the southern islands; accordingly, the vastly predominant weight in the government is with the southern islands. The people of the southern islands feel that if money is to be spent in improving conditions in the northern islands it had better be Netherlands money. Moreover, the officials on the northern islands are appointed not from The Hague but from Curacao.

The dissatisfaction of the northern islanders has become so great that it has created a "free from Curacao" movement. These people are not disloyal to the Netherlands. They desire to be cut loose from Curacao and placed under the direct government of the Netherlands; but if they must remain a part of the Curacao colony they desire a government which will be truly representative of all the six islands. Both schemes have been proposed in the Netherlands States-General.

The Dutch press has in recent years discussed at great length the character of the government of Curacao. The policy of a recent Governor was characterized as one "without steadiness, without thought of tomorrow, without moral influence, and free from everything except petroleum," and it was charged that the government through a long-term lease granted by this Governor to the Curacaosche Petroleum Industrie Maatschappij for the land about Carácasbaai, had lost all control over the best of Curacao's harbors, even in time of war, and retained only a limited authority for purposes of quarantine.

But in spite of all these governmental difficulties, the suggestion frequently made in the States-General that the Netherlands Government sell its West Indies islands is repelled as unworthy of a great colonial Power.

Colombia's Importance in the Oil World

Although Only One Company Yet Has a Commercial Crude Output, This Tropical Country Holds Eighth Place in International Production. Expansion Now at Stake Due To Oil Laws.

COVERING an area of about 500,000 square miles, and with its 1,577 miles of coastal boundaries on both the Atlantic (Caribbean Sea) and Pacific oceans, Colombia abounds in mineral wealth. Vast quantities of coffee are produced and there are over ten million head of horned cattle on the ranges of the country. Gold, silver, platinum, emeralds and salt are mined in its mountain fastnesses, and at present petroleum is produced to the extent of 20,000,000 barrels per year. Like other Caribbean oil centers Colombia is strategically situated as to the markets of the world, being closer to the Panama canal than even the famous Maracaibo oil fields. It is rich in history, right from the days of 1499 when Alonzo de Ojeda cast the anchor of his galleon in its coastal waters. In the 16th to 18th centuries Spain extracted vast streams of gold from this treasure house amounting to over $600,000,000, throwing aside platinum as worthless. Today the population numbers over seven million, of which 20 per cent is pure white, and the balance a mixed Negro-Indian race.

With such rich romance in its history it is no wonder that Colombia attracted the oil scout, the geologist and the engineer. When searching for rubber Roberto de Mares, an outstanding French engineer living in the country, became impressed with the manifestations of petroleum in the area tributary to the Magdalena river. He secured a concession stretching for 120 kilometers along the Magdalena and Carare rivers, and covering about 5,339 square kilometers. Lacking capital De Mares undauntedly peddled his concessions from city to city, and from company to company for ten years, finally interesting a group of Pittsburgh men who had had much oil exploitation experiences. Without underestimating the dangers and difficulties and with some of the inspiration and enthusiasm emanating from De Mares they launched the Tropical Oil Company to work the concessions.

Passing over the major obstacles that the concern met in launching out on a wildcatting program during a period that the war had caused the United States government to place an embargo on exports of drilling equipment, reference should be made to the task that the company tackled of transporting a complete drilling outfit 400 miles up the tedious and difficult Magdalena navigation and up a small tributary stream to the first location 18 miles into the interior. It was impossible to use anything more pretentious than native dugouts.

By fitting these primitive craft with small gasoline motors, and by sub-dividing the drilling equipment into the smallest possible units, the tremendously difficult undertaking was accomplished. Piece by piece it was transported upstream, man handled over obstructions and across shallows, and finally dragged through the dense undergrowth in the

Mugrosa No. 2 blowing in.

Laying the Andian pipeline through the jungle was a superhuman task.

El Centro, once a jungle and now the main camp of the Tropical Oil Company.

intense tropical heat made worse by multitudinous insects to the drilling site at Infantas, where an advance guard hacked with their machetes a clearing in the dank jungle. Then followed months of hard work, meanwhile fighting off or enduring fevers, driving their improvised tools into the structures and sands until a flow of oil justified the optimism and faith of De Mares and his backers. By the end of 1918 two more rigs were operating and three producing wells were completed on the property. Thus was born Colombia's petroleum industry!

It soon became apparent, however, that commercial production and delivery of crude to deep water called for an outlay that the Tropical Oil Company was not in a position to undertake. In 1920 the International Petroleum Company, a subsidiary of the Imperial Oil Ltd., which in turn is controlled by the Standard Oil Company of New Jersey, took over the concessions and control, thus adequately assuring the future exploitation of the valuable property.

The Tropical Oil Company's concession is located on the right bank of the Magdalena River approximately 400 miles from the coast; it comprises an area of approximately 1,300,000 acres. It is bounded on the north by the Sogomosa River, on the west by the Magdalena River, on the south by the Carare River, and on the east by the eastern range of the Andes.

So far developments have been confined to the north half of the Concession involving work on five separate structures. Practically all the oil produced so far has come from the Infantas and La Cira structures. Some production has been found on the Colorado and San Luis structures, and one good producing well with an initial production of 1,200 bbl. per day has been completed on the Mugrosa structure. There are a number of other promising structures on the Concession which as yet have not been tested. The prospective area covered by these structures is considerable.

Magdalena river vessel with Company supply barges.

The total production from the Concession to the end of 1930 aggregates approximately 84,338,239 bbl.; of this some 7,750,000 bbl. will have been treated in the company's 7,000 bbl. per day capacity refinery at Barranca Bermeja, and the products marketed in Colombia, while the balance has been exported.

Statistics covering crude produced, refinery runs at Barranca Bermeja, and exports, follow:

Crude Produced

Year	Barrels
1921	66,480
1922	323,598
1923	424,876
1924	444,743
1925	1,006,707
1926	6,443,540
1927	15,002,154
1928	19,895,677
1929	20,384,548
1930	20,345,916
Total	84,338,239

Crude Run at Barranca Bermeja Refinery

Year	Barrels
1921	Nil
1922*	182,326
1923	340,615
1924	295,489
1925	587,022
1926	737,101
1927	1,206,499
1928	1,474,642
1929	1,667,761
Total	6,491,455

* Commenced Feb. 1922

Barranca Bermeja, with storage tanks, refinery, and part of plant.

Crude Oil Exports

Year	Barrels
1926	4,638,377
1927	13,677,477
1928	17,910,178
1929	18,600,467
1930 (Est.)	18,987,974
Total	73,814,473

The drilling programme on the property has been regulated so as to develop the quantity of oil required currently to supply the needs of the pipeline to the sea board, and the local market. The earlier development work was effected with a combination of rotary and cable tools, but towards the end of 1924 the use of cable tools practically ceased, and for several years past all drilling has been carried out with the most modern rotary equipment. The caving nature of the formations encountered was found to be unfavorable for the use of cable tools, but the territory so far drilled up has proved to be ideal for the rotary method.

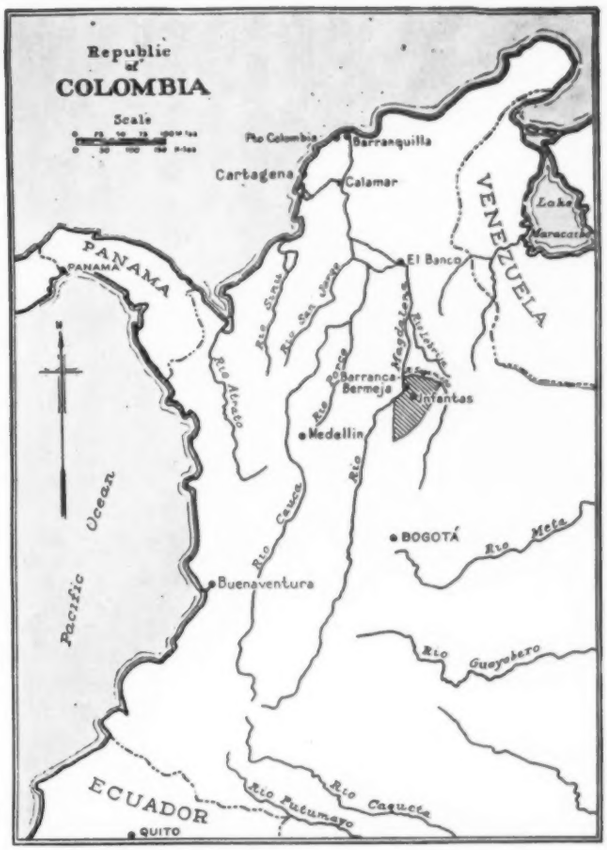
Although no exceptionally large wells have been completed on the property, the initial production of the average completed well is very satisfactory. Well No. 32, with an initial production of 6,000 bbl. per day, is probably the largest well ever brought in on the property. Up to the end of 1930, some 600 wells have been completed of which only 22 have been abandoned. In 1930 a total of 114 producing wells having an average initial flow of 694 barrels were completed.

In the early days of development, all wells were produced by natural flow, but as the age of the field increases, the percentage of wells that have to be put on the pump is becoming greater. At the present time, 177 wells are producing by natural flow and 184 wells are pumping; the balance are either shut-in due to their production not being required, being produced under gas lift, or used as key wells for repressuring. The Company operates its own power plant in El Centro making it possible to completely electrify the field for all producing operations with the exception of drilling.

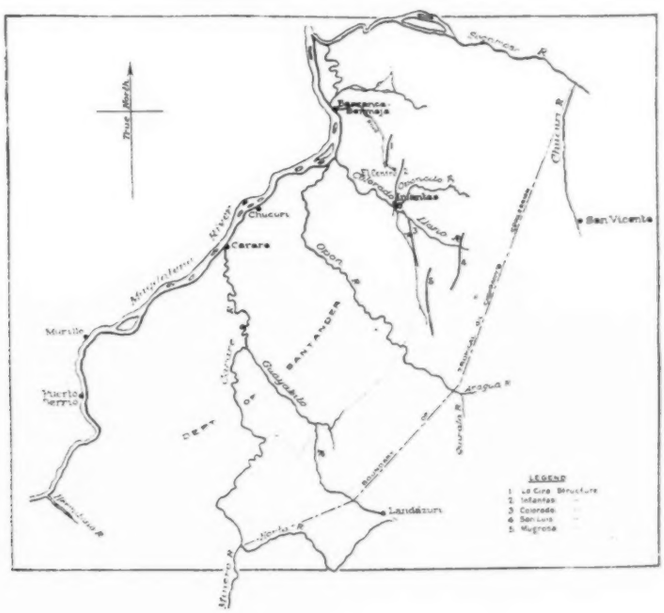
The petroleum-engineering and geological departments co-operate in the application of the most modern methods of drilling and production. Gas conservation is carefully watched, gas lift is applied wherever its use is justified, and a repressuring programme has been under way for the past 18 months. Special attention has been paid to the question of well spacing, having regard to the characteristics of the two main structures.

The gravity of the oil on the two producing structures ranges from 18 deg. A.P.I. in the shallow sands to 30 deg. A.P.I. in the deeper sands. The average gravity of the oil transported through the pipeline is from 26 deg. to 27.5 deg. A.P.I. The average depths of wells is as follows—Infantas, 2,100 feet; La Cira, 2,800 feet; San Luis, 3,000 feet; Mugrosa 2,250 feet and Colorado 4,600 feet. The average depth of the 600 wells drilled to date on all the structures is 2,322 feet. In 1929 the average number of strings of tools employed was 16.6 and a total footage of 324,817 feet was drilled.

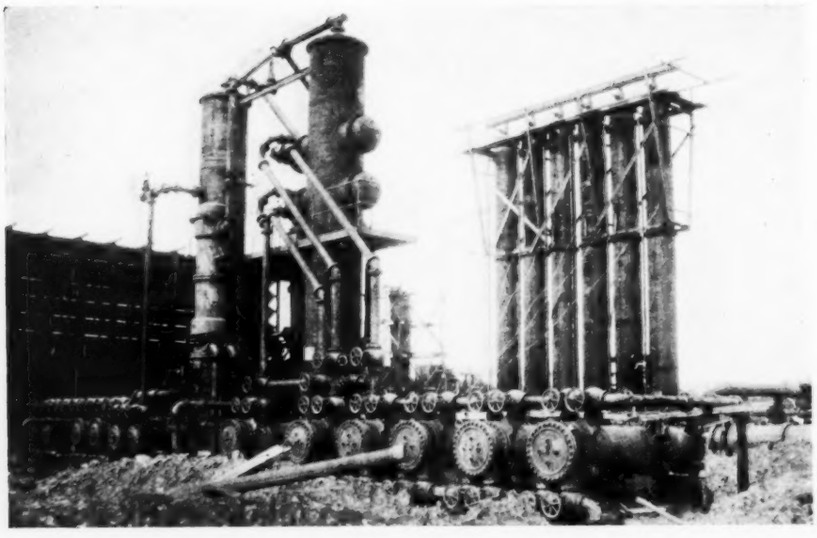
All materials and supplies for the Tropical Oil Concessions enter the country through the port of Cartagena. Transhipment is made by the railroad of the Colombia Railway and Navigation Company, Limited, 105 Km. to the Magdalena River port of Calamar, where the



Map of Colombia; the Tropical Oil concession is shown by ruled lines.



Location of the Tropical Oil Co.'s concession in Colombia with its five oil fields.



Still and absorbers at El Centro, Colombia.

Company maintains material yards and warehouses. The Company owns its own fleet of river steamers and lighters transporting supplies up river to the discharge point of Galan for Barranca Bermeja. From Galan to El Centro the Company owns and operates a meter gauge railway 30 Km., in length. From El Centro, where the field headquarters are located, the material is distributed to all parts of the field by truck and tractor.

Since the start of operations, the Company has constructed over 300 Km., of road on the concession. Due to the nature of the Country and the dense tropical undergrowth both the construction and maintenance of these roads is very costly. At the present time the Company's engineers are also constructing a highway from San Vicente to Barranca Bermeja under the auspices of the Province of Santander.

The Magdalena River fleet of the Tropical Oil Company consists of nine stern-wheel shallow-draft river steamers and 32 steel barges. These vessels were specially constructed for the carrying of petroleum products in bulk to supply the local market. Their hulls are heavier than the usual run of boats operated on the Magdalena River, and their size is controlled by the nature of the river, which at some seasons of the year is extremely low.

In the high water season, these vessels have towed as much as 9,000 to 10,000 bbl. of cargo on one trip to up-river points. Under the same conditions they have moved as much as 12,000 bbl. in 5 barges down river to Barranquilla, a distance of 395 Km., the round trip taking 14 days.

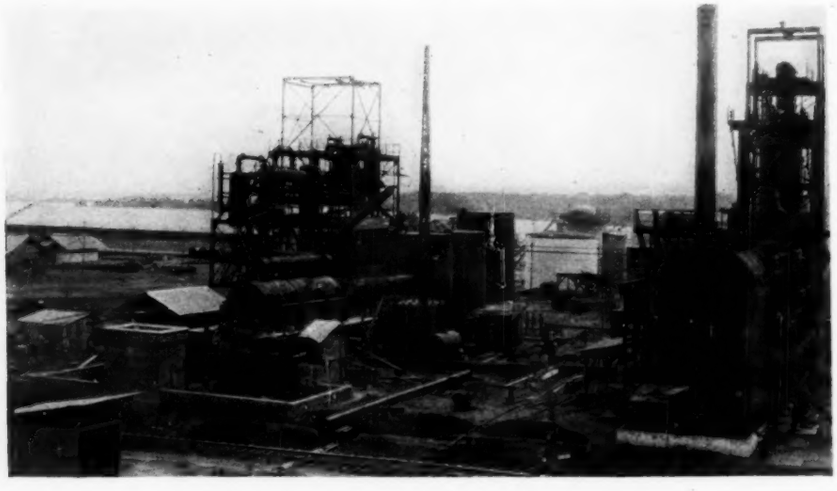
During the low water period, the carrying capacity of the fleet is considerably reduced, some times being only 3,000 to 4,000 bbl., and the treacherous nature of the river may cause the round trip to take as much as 21 days. One of the vessels is operating as an express boat from Barranca Bermeja to Calamar for transporting incoming and outgoing employees, making the trip down river in approximately 24 hours and the return journey up stream in 48 hours. At the river port of Galan, the Company operates a 600-ton sectional steel floating dry dock for the handling of their river equipment. This was necessitated by the fact that there were no provisions anywhere on the river that would take care of their vessels. In the period of 1926, 1927 and 1928 over 75,000 tons of freight (supplies and equipment) valued at $14,500,000 was shipped up the river to headquarters.

The Tropical Oil Company has eight crude-oil storage tanks on the concession with a total capacity of 450,000 bbl. Five of these tanks are located on the field and three at the Barranca Bermeja refinery. Also, a chain of bulk storage stations has been established along the river Magdalena and throughout the country to handle the marketing of the Company's local refinery.

The Andian National Corporation—the pipe line company—has 34 crude oil storage tanks with a total capacity of 1,973,082 bbl. Of these, two are at El Centro, three at the Barranca Bermeja Refinery, 14 at pipeline stations enroute and 15 at the terminal of the pipeline at Mamonal, near Cartagena.

The total number of "imported" employees on the property at the present time is approximately 400, of which about 100 are resident with their wives and families. All imported employees are engaged on a two-year contract with free transportation paid to Colombia, and return fare upon the completion of this term. The Company provides single employees with free furnished quarters, board and medical attendance. Married employees are provided with furnished five- and six-room bungalows, free medical attendance and a living allowance every month in addition to salary. For the benefit of the staff, the Company has provided Club Houses at Barranca Bermeja and El Centro fully equipped, as well as tennis courts, swimming pool and a nine-hole golf course. Meals are provided for the

New refinery completing at Barranca-Bermeja.



single men in the Company's mess halls, and the married employees may obtain provisions, etc., by purchasing same at the Company's commissaries, which are maintained both for the benefit of the staff as well as the workmen. Most foreign employees complete their contract period, and a good number sign renewal contracts for a further term.

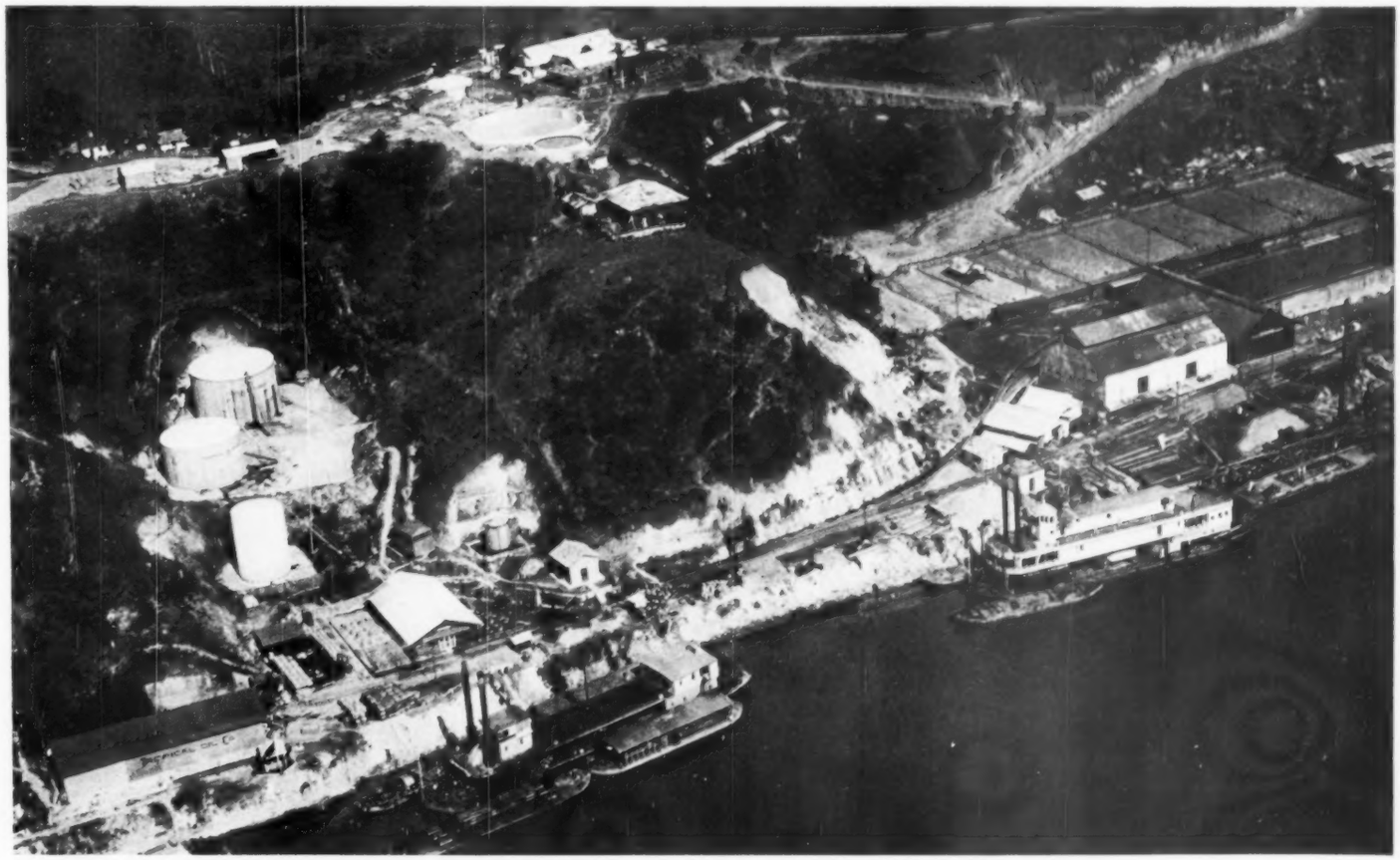
There are approximately 4,000 workmen in the employ of the Company. The single men are housed in sanitary and comfortable bunk houses at various centres, and married quarters are provided for a limited number of other employees. The Company has erected club houses at the principal camps, and encouraged the development of sports and amusements as shown by some of the illustrations reproduced in previous issues of WORLD PETROLEUM. Playing fields have been laid out at all camps, and a football league organized of eleven teams, playing regular interdepartmental games every week end. Boxing has been initiated, and two or three weekly events are now regularly held. The weekly moving-picture attendance averages well over the 1,500 mark. A small church and two schools have been built and donated by the Company to the community. Free medical attendance is extended to all employees at the Company's hospitals, and a large amount of sanitation work has been undertaken at all points of operations.

At the commencement of operations the Colombian labor was largely of the transient type, making it difficult for the Company to maintain a large staff of skilled workers. With improved living conditions and increased development of the property, the situation has considerably improved, and the more permanent character of the Colombian employees has enabled the Company to train men for better positions, as skilled workers in all departments.

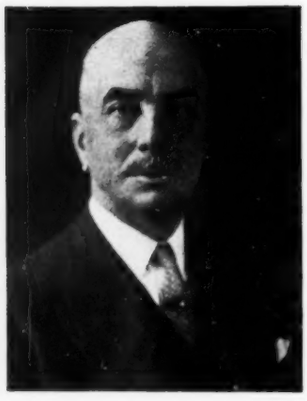
At the present time a selected number of the better type of workmen are holding positions as rotary drillers, production men, steam shovel, power and gasoline plant operators thereby replacing "imported" employees.

The Andian National Corporation's 10″ pipe line extends 560 Km., from the wells at El Centro to seaboard. It was constructed under the supervision of Capt. J. W. Flanagan, president; D. O. Towl, vice-president, and M. M. Stuckey, general manager in Colombia. In its seven day journey the crude oil traverses a varied region, ranging from dense forests and swamps to cultivated areas bordering the Magdalena River. Originally constructed as a single line in 1926, to deliver 30,000 bbl. daily, it was but a brief interval before the demand for Colombian crude oil outstripped the line capacity and in 1927 the throughput was raised to over 50,000 barrels daily. This was accomplished in record time, by "looping", involving the laying of 440 Km., of additional line.

Eight main line pumping stations which have American Diesel engines as power, are in constant communication with one another—made possible by the radio telephone. They move the oil in its northbound journey to the Mamonal



River boats, camp, tanks and railroad of the Company at Puerto Berrio.



C. O. Stillman, President, Imperial Oil Ltd.

Club built for Andian pipeline employees.

terminal, which is equipped to load ocean vessels at a maximum rate of 12,000 bbl. per hour. Since its completion the line has operated continuously and to date over 72,000,000 bbl. of crude oil have passed through the system. It has been found that sections of the line, traversing swampy areas are a prey to corrosion. This has proven to be a very serious problem, and the engineers of the Andian National Corporation are now engaged in a detailed investigation as to the best methods of retreatment and protective coverings to check corrosion.

The original intention was for the pipeline to follow the Magdalena River generally from Barranca to Calamar and then across country to Mamonal, within 10 miles of Cartagena. It was early apparent that the difficulties which had confronted the pioneer oil drillers on the De Mares Concession would be multiplied and aggravated in carrying this stupendous task to completion. Plunging into the jungle at Barranca the engineers conducted a reconnaissance survey through 150 miles of dense tropical growth, which screened the bluffs, gulches, swamps and water courses that are features of the topography.

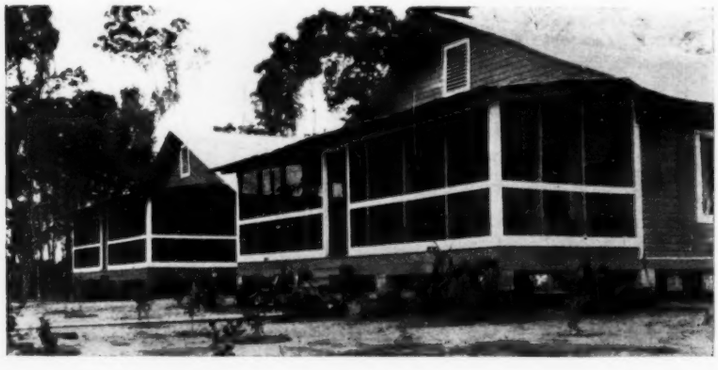
In this region the temperature seldom falls below 80 deg. Fahr., and there is a heavy precipitation, four to five inches a day being not uncommon. The nature of the work precluded the construction of permanent camps and the engineers used tents, whilst headquarters were established on house-boats which moved down the river as the work progressed. Once the jungle belt had been crossed a more open, but often swampy, area stretched for about an equal distance, and although the going was easier, conditions were no more pleasant. From the river at Calamar to the terminal the country was open and more rapid progress was possible.

A. M. McQueen, vice-president, International Petroleum Company.

This preliminary survey being completed, the location surveyors mapped the route in greater detail, studied the contours, cut the line and drove the stakes, completing their work and having the whole scheme on paper in about a year from the date on which the first party debarked at Barranca.

The pipe used was 10 in., 41 lbs. with a tested pressure of 1,000 lbs., running 110 tons to a mile. Coupled joints were used throughout, as welding would have necessitated a large importation of skilled labor. To facilitate handling, the pipe was supplied in 20 ft. sections, only half the length usually employed, and, including pumping equipment, 60,000 tons of material went into the construction of the line and the eight Diesel pumping stations, each with the necessary tankage, which are situated at strategic points on the route.

The first cargo of pipe was unloaded at Cartagena March, 1925, and, commencing at the coast end, the first joint was laid on April 4th. Construction was carried out in sections, and as each was completed the working crews moved to the head end to start on the next section. Rapid time was made on the 60 miles from Cartagena to Calamar, but, once on the river stretch, the full magnitude of the undertaking was apparent and only the utmost skill of the engineers, the tenacity of the pipeline gangs, and a prodigal expenditure of effort and money brought the construction to a successful conclusion. At its maximum the con-



Typical staff residences at Infantas.

G. Harrison Smith, President, International Petroleum Co.

struction force consisted of about 3,000 Colombian workmen and 250 staff employees.

The Magdalena River was both a help and a hindrance. Where its course cut across the route of the pipeline it was an almost unsurmountable barrier; but where it paralleled the construction it facilitated the transportation of equipment and material tremendously. "Deposits" were designated by the engineers at the most convenient points along the river and at these stations the pipe and supplies were put ashore. River steamers were chartered and barges were built for freighting the pipe, each capable of carrying 300 to 500 tons, dependent on the state of the river. Careful and competent navigation by skilled Colombian river men was required to ensure safety on the ever changing and fast running Magdalena and usually the steamers had each two barges in tow.

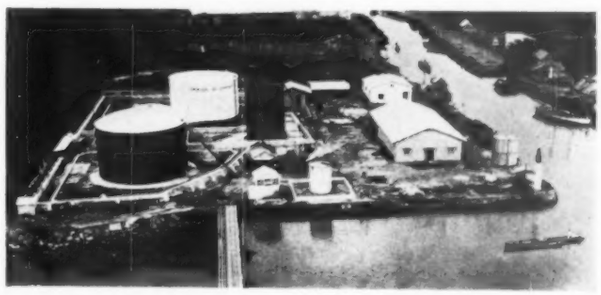
Arriving at the deposits, especially where the banks were steep, the work of unloading was strenuous in the extreme, and was but the preliminary to even more arduous labor as the pipe had to be loaded on eight-wheeled or "truss-wheeled" wagons and hauled, usually by tractors, over roads specially built for the purpose, to its place along the right-of-way where it was strung out for coupling as part of the line.

The river served another useful purpose for, as far as possible, house-boats were used to accommodate the field force. These were steel barges, fabricated in Pennsylvania, U. S. A., and assembled on the riverbank at Calamar. With the addition of a wooden superstructure they became veritable hotels, with modern plumbing, baths, electric light and the culinary equipment of a home. Life on those floating residences was in direct contrast to conditions on shore where the housing consisted of tents and small portable structures which could be easily moved. The spongy nature of the ground required that the tents be fitted with floor boards and great care was taken to ensure that the camps were kept sanitary and every precaution adopted to guard against mosquitos.

Where the pipe had to be laid in the riverbed of the Magdalena or its tributary streams the difficulties encountered might well have daunted the boldest and most optimistic. At some points it was possible to couple up the pipe and tow it across, but, where the reaches were wide, a specially constructed barge was employed. This barge was towed across stream, the pipe coupled a length at a time and dropped over the stern as the barge progressed.

The important and expanding Canadian market, and to a lesser extent England, Belgium, Italy and the Argentine—apart from keeping pace with the growing needs of Colombia—greatly extend the future demand for Colombian crude oil. Fronting the Caribbean Sea, which borders and surrounds many populous countries and islands—and in close proximity to world shipping lanes, —Colombia is strategically situated, and the crude oil from her fields, or the refined products derived therefrom, should readily find other lucrative markets if the U. S. A. imposes a tax on foreign oils.

Railroad construction forms part of the costly work of oil production in the tropics.



Barranquilla development of the Tropical Company.

Typical Colombian jungle where oil is located. Two wells can faintly be seen in the background near the road.

New Texas Discovery in Major Class

Rapid Development in Rusk and Gregg Counties is Today's Most Unsettling Factor in Producing Branch of World's Petroleum Industry. . . .

By Early Deane and Basil B. Zavoico

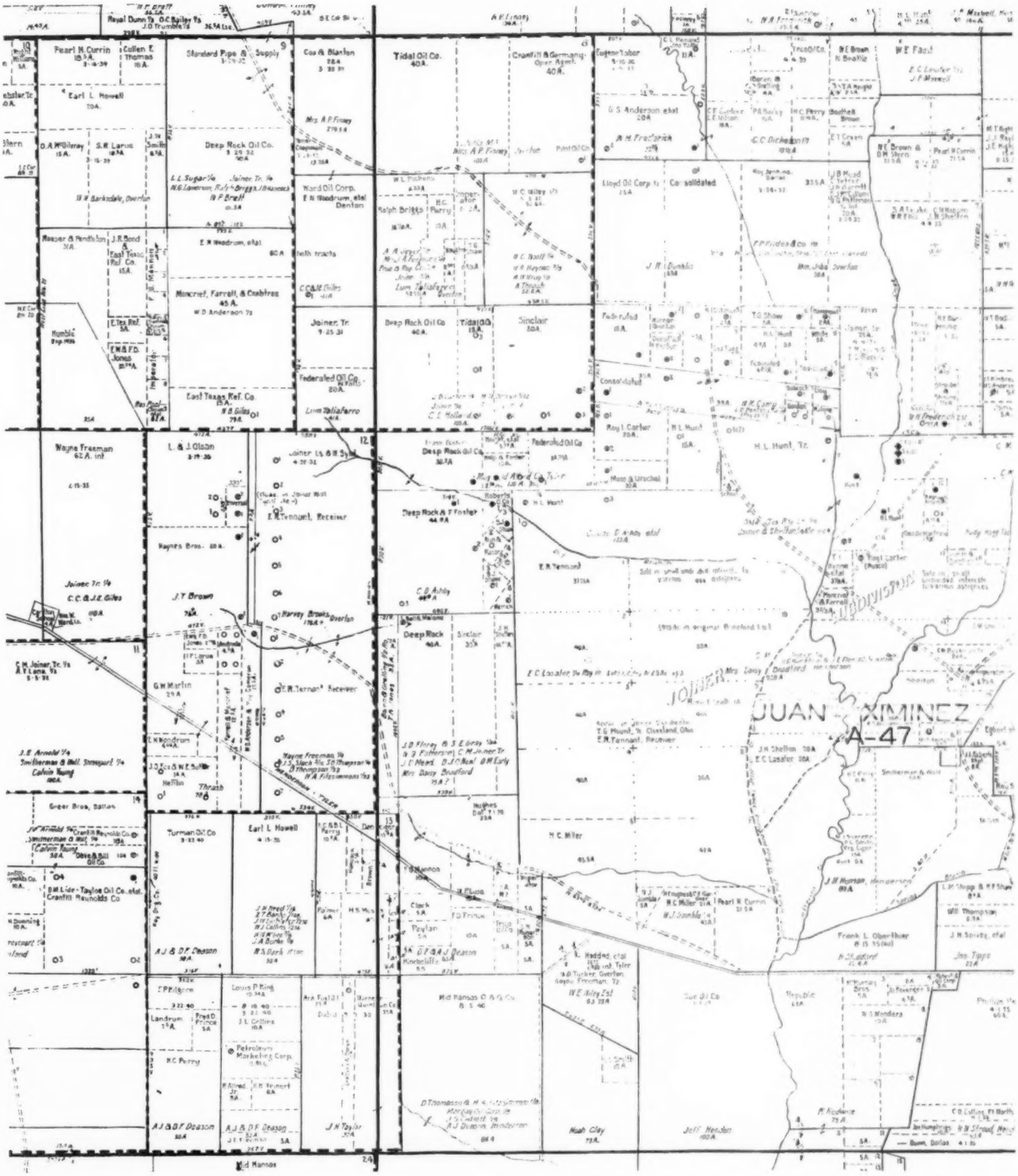
C. M. JOINER completed in September, 1930, a small producer six miles west of Henderson in Rusk County, opening an entirely new area. This 250 bbl. well with a total depth of 3,592 feet was the forerunner of the most active development campaign seen in United States for several years, due to peculiar adaptability of the area for small independent operators.

In late December the Deep Rock Oil Co. brought in its No. 1 Ashby, located 1¼ miles west from the discovery well, this well having an initial production of 9,000 bbl. from a total depth of 3,615 feet. Within a few days E. W. Bateman completed its No. 1 L. D. Crim, located 10 miles north from the Joiner discovery, and rated as a 20,000 bbl. producer from 3,650 feet. Late in January the Arkansas Fuel Oil Co., a H. L. Daugherty and Co., subsidiary, and Moncrief, No. 1 Lathrop, came in for an estimated flow of 18,000 bbl. from 3,572 feet, this well being located 13 miles north of E. W. Bateman No. 1 L. D. Crim.

Within a period of but two months spectacular production was found to extend 25 miles from south to north, while completions to-date indicate a width of about three miles. It is, of course, not likely that all of these 75 square miles, or 48,000 acres, will be found to be productive, but the four widely separated completions described above indicate the large potentialities of the area. At the present time the number of active operations in approaching 150, including locations and drilling wells. About 30 producing wells have been completed with an estimated potential daily production in excess of 75,000 bbl., while but 15,000 bbl. are being actually produced.

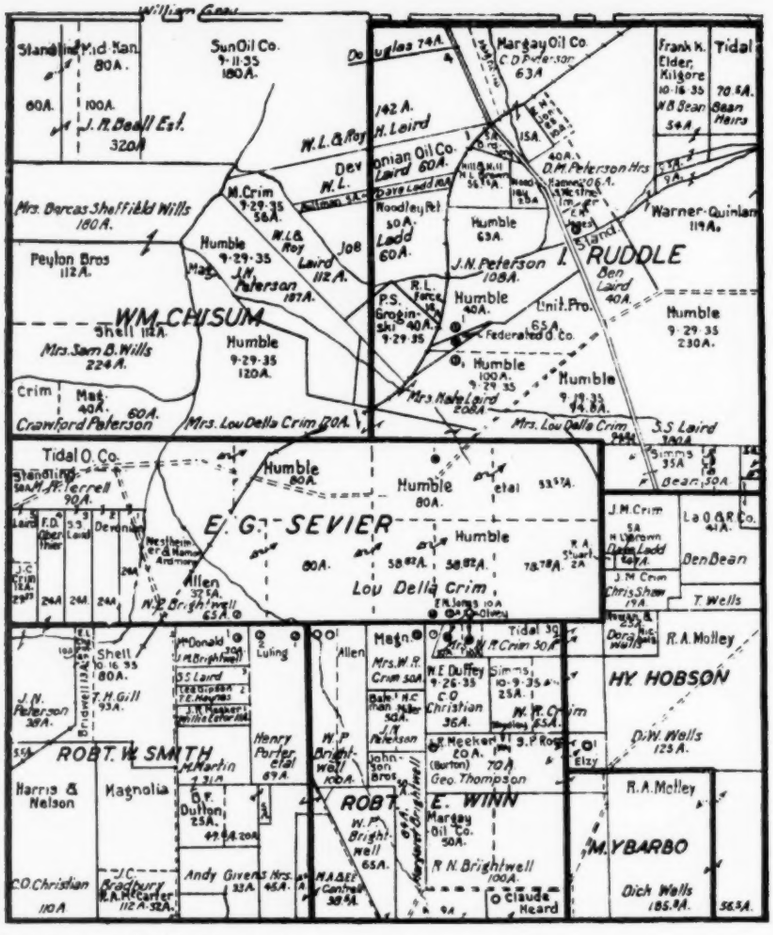
The surface formations in Rusk and Gregg Counties are represented by the Eocene sediments. The production is

Bringing in Deep Rock, No. 1, the first big gusher in the Joiner field.



Joiner field, Rush County, Texas. (A-Acres)

Courtesy of Zingery Oil Map Co. Fort Worth, Texas. (Copyright)



Scale, 1 in. = 2,759 ft.) (A = Acres)

Kilgore-Bateman field, Rusk County, Texas. An air map of this sector is reproduced on the following page.

Courtesy of Zingery Oil Map Co. Fort Worth, Texas, (Copyright.)

derived from the Woodbine Sand, encountered at about 3,600 feet, of the Comanche Series. The Woodbine Sand is the most prolific producing formation in the East Central Texas, where the Mexia-Powell fault zone fields have been producing for many years, and where the Van Pool was opened and developed into one of the largest fields in United States within the last year. The oil in Rusk and Gregg Counties is accumulated along an old shore line, as the sand lenses out to the East towards the Sabine Uplift. The oil is probably derived from the broad basin, about 50 miles in width, laying between the Rusk-Gregg area and the Van Zandt County district.

To obtain remunerative commercial production it is necessary to drill within one to three miles west from the point where the Woodbine Sand pinches out; but, because the old shore line curves very considerably, it is quite impossible to predict the actual limits of the fields until they are completely developed. Sand conditions also may be locally unfavorable, and accordingly the size of wells will vary very considerably. As the production will be limited by high former land mass on the east side of the area, and by water level on the west basinward side, the problem for geologist is to follow the producing sand belt as closely as possible, picking out possible channels of greatest sand thickness.

The study of the area in regard to higher structural features is unnecessary, as such points will not have any sand. This characteristic was primarily responsible for long delay in discovery, as all active major companies were unsuccessfully testing all the higher structures, and it remained to the three smaller operators (Joiner, Bateman and Deep Rock Oil Co.) to drill in the low area. (See Texas Review, pp. 241-242.)

The thickness of the Woodbine sand varies from 0, as it pinches out to the East, to about 60 feet along the Western limit of production. The average thickness over the whole producing area will probably be around 25 feet. The gas pressure and volume in all completions to-date have been extremely low, (30 to 50 lbs.) the hydrostatic pressure probably accounting for large flowing wells. These conditions indicate that the naturally flowing life of the producing wells will be short, and that if allowed to produce wide open, the water encroachment will be very rapid. Therefore, considering the conditions within the reservoir, orderly development and fractional production are imperative to insure very gradual encroachment of water table, and thus greatly increase the ultimate recoveries of individual wells and of the whole area.

Because of the fact that the larger companies tested the area unsuccessfully very few large blocks existed in the Rusk-Gregg area, most of the land at the beginning of the rush being either leased to small independents, or un-

Oil men also gather daily at the Gregg Hotel, Longview, Texas. Building a new wing immediately will result from the oil boom.

leased. Also the original tracts are very small, averaging not over 50 acres each, thus greatly increasing the number of operators. Because of shallow depth of production, 3,600 feet, and resulting cheapness of drilling ($12,000 for dry hole and $25,000 for completed oil well), as well as the availability of small leases, the independent producers crowded, and are still crowding, into the new district, coming from all over the Mid-Continent area, as the conditions are ideal for small operators.

The major companies, on the other hand, were, and are, hesitating in entering the Rusk-Gregg district. At first they held back because it was not considered any too favorable by geological departments, and at the present time because they realize the great potentiality of the area and the boom conditions, and figure it may be cheaper to buy oil from smaller producers, probably under production costs, if the wells stop flowing within few weeks, due to unwarranted rate of development caused by small tracts and varied interests.

Where larger blocks or leases have been available they have been taken up by major interests, and additional sales of such character will undoubtedly occur. The Humble Oil & Refining Co. (S. O. of N. J.) was the first large purchaser buying out the Bateman interest in the Kilgore Field for $1,500,000 cash and $600,000 out of oil, and also securing a 6,000 acre block of leases between the Joiner and Bateman discovery wells, this later purchase being made together with the Gulf Producing Co. The Arkansas Fuel Oil Co., the co-discoverers of the Longview field, is reported as negotiating for the purchase of the other half interest of their holdings for a consideration of $3,500,000. Sinclair Oil & Gas Co. has been buying leases in the Rusk-Gregg trend, while Sun Oil Co., Amerada Petroleum Corporation, Shell Oil Co., Vacuum Oil Co., Southern Crude Oil Purchasing Co., Houston Oil Co., Margay Oil Co., Barnsdall Oil & Refining Co. and others are maintaining offices in Tyler, and either are active, or are contemplating entering the area.

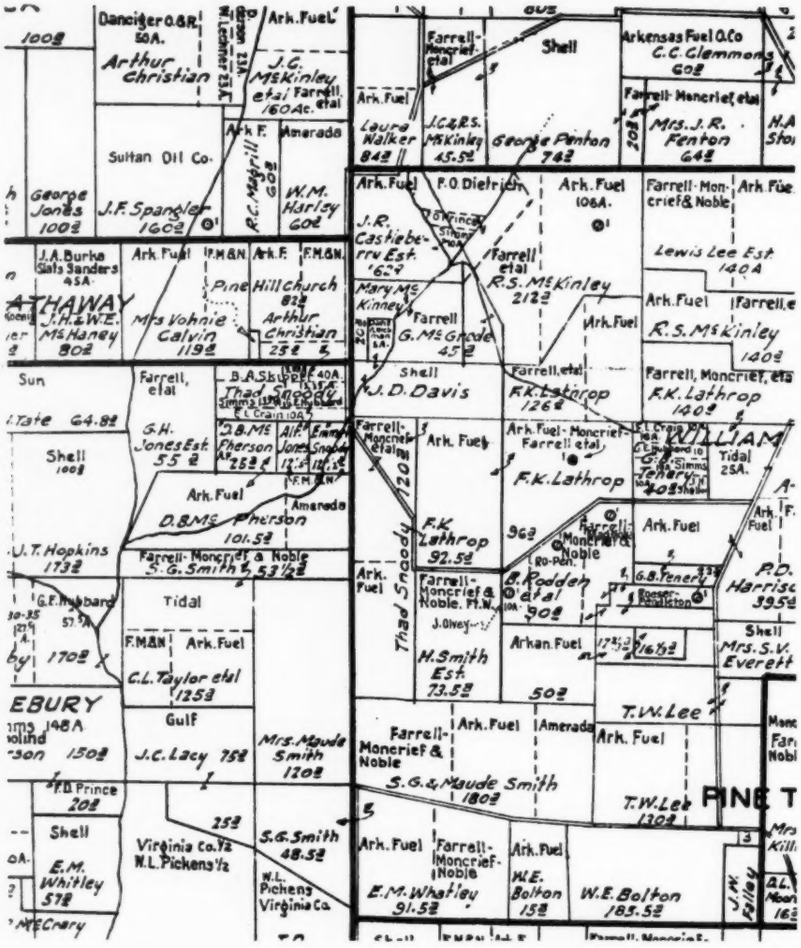
Three separate fields have been opened to-date. The Joiner field, in Rusk County, has at the present time 25 producing wells, some of which lately ceased to flow; the Kilgore-Bateman field, in Rusk County has six producing wells, and the Longview field has one producer.

The Joiner field has been defined by dry holes on the south, east and northeast sides, while the other two fields have as yet no dry holes. The number of active operations is approaching 150 in all three fields, while by July this number may increase to 400. Because it takes but 20 to 35 days to complete a well in this district the potential production is expected to climb very rapidly and will probably reach 250,000 bbl. per day by 1st of April, and 500,000 bbl. per day by June. Preliminary estimates predict that the cumulative recovery of the area may reach 1,000,000,000 bbl. Recoveries per acre will vary from 500 to 1,000 bbl. on the east side of the fields, where sand is the thinnest, to 25,000 bbl. on the west side.

Copyright, Edgar Tobin Aerial Surveys, San Antonio, Texas.

Air map of the line map, on page 226

Daily scene in lobby of the Blackstone Hotel, Tyler, Texas, headquarters for the oil boom.



(Scale, 1 in. = 2759 ft.) (A = Acres)

Longview field, Gregg County, Texas.

Courtesy of Zingery Oil Map Co., Fort Worth, Texas, (Copyright.)

The Rusk-Gregg district is located within a few miles of major trunk lines connecting various Mid-Continent fields with the Gulf Coast. Connections with those are either already made or planned. The Humble Pipe Line Co. has completed its 8-inch line from the Kilgore-Bateman field to its 10-inch line running from the Van field to Louisiana, this branch will be probably extended to the Joiner field. Henry L. Daugherty & Co., through its subsidiaries, is planning to build an 8- or 10-inch line from Longview field to Shreveport, Louisiana. The Gulf Pipe Line Co. is reported considering the connection of the Joiner field with its Oklahoma-Port Arthur trunk line which passes through western part of Rusk County. The Magnolia Pipe Line Co. announced that it will construct a 10-inch line from the Kilgore field to its Arkansas-Gulf Coast trunk line; this line also will serve as a common carrier, probably charging 30 to 40c per bbl., including the gathering charge, for moving the crude oil to the Gulf Coast for loading on tankers.

The Rusk and Gregg Counties are traversed by several railroads, the more important ones being the Texas-Pacific, the Missouri Pacific and the Santa Fe. Most of the oil taken from the three fields is run to loading racks by short pipe lines of 4- and 6-inch diameter. The Joiner field is connected by four 4-inch lines to Missouri Pacific loading racks, these lines belonging to minor purchasing concerns; also a 6-inch line of the Sinclair-Texas Pipe Line Co., which runs to a 40-car loading rack at Friar Switch, giving direct connection with Sinclair refinery at Houston. A 4-inch line will connect the Joiner field with the Beacon Oil and Refining Co.'s topping plant near Henderson, which is now under construction.

Several skimming plants are under consideration, or construction, by minor interests at local points. J. P. Gillen is planning a 2,500 bbl. skimming plant in the Joiner field, while the East Texas Refining Co. is constructing a plant at Friar Switch, 3½ miles north. Same company also plans the construction of a 6,000 bbl. plant near Longview field.

Because of small gas volume, but one casinghead plant is being planned; the East Texas Refining Co. having such plant under consideration for the Joiner field, where gas tests 2.70 gals. per 1,000 cubic feet.

The crude oil from the Rusk-Gregg district, tests 36 to 40° Be, is olive green in color and contains very little sulphur (0.218 per cent). The crude yields, by Hempstead distillation, 33 to 37 per cent gasoline, 10 to 15 per cent kerosene, and 30 per cent gas oil.

The current market price is from 35 to 40c as sold to various purchasers. Posted price, when major pipe lines will enter the district, and when the proration is put into effect, will be probably more in line with Mid-Continent area, where similar grades bring now $1.00. If, however, the Rusk-Gregg crude will be sold at the current prices for any length of time, it is bound to have a distressing influence on the balance of Mid-Continent. Proration agreement has not been reached yet, but because of huge potential that will be built up within very short time, also because of the danger of water encroachment under unrestricted flow, and because of small gas pressure, the saner operators will probably prevail in curtailing the production to market demand. An allowance of around 50,000 bbl. for the Rusk-Gregg district will be probably acceptable to all operators, and such production could be handled by the pipe lines and purchasers, especially because the season of increased demand is approaching.

The Rusk-Gregg Counties illustrate how an entirely unforeseen factor may upset a carefully balanced supply and demand position of the oil industry in the United States in a brief span of two months, and indirectly affect the world oil prices.

(See page 165, February, 1931, issue for strategical location of Rusk-Gregg District in relation to Gulf Coast.)

▼

Kilgore-Bateman field, part of which has been purchased by Jersey Standard interests for $2,000,000

Oblique photograph of Turner Valley oil field, illustrating how seven successive vertical pictures overlap when mapping an area.

Geological Survey From the Air

Experiences While Searching For Oil In the Arctic and Tropics. Methods for Securing Successful Aerial Photographs for Composite Maps

By Theo. A. Link, Ph. D.

Geologist, Imperial Oil Ltd.
Calgary, Alberta.

IN international oil field operations air craft are being extensively used, not only for geological survey work, but also for facilitating the movements of company officials across jungles and mountain ranges. Weeks of time are saved in journeying from widely separated camps where poor road conditions exist or over inaccessible territory. Dr. Link gives a human interest to his story of aerial geological survey and describes methods of procedure.—Editor.

USE of aerial photographs in geological work is no longer a novelty. It has become common practice. An article on this topic probably will not be read by many geologists because the current technical literature contains its quota of papers on the subject. The editor of WORLD PETROLEUM invited me to write on this topic and I promised to do so "if the spirit moved me." Tonight my thoughts, as they often do, wander back to that country in far northwestern Canada which fringes the Arctic—the Mackenzie River region. As far as I am concerned aerial photography began with that never-to-be-forgotten aeroplane trip to the Ft. Norman oil-field in 1921. Aeroplane photographs and their significance meant little to me before that eventful trip. The three previous seasons had been spent in that same area, and during these I did all of my travelling and exploratory work by motor or steamboat, canoe or on foot. After leaving the end of the steel, either at Ft. McMurray on the Athabasca River or Peace River Landing on the river with that name, it required from three to five weeks to reach Ft. Norman, situated on the banks of the mighty Mackenzie. These downstream trips were also made in canoes, motor or steamboats.

Over the Cold Northland

IN the spring of 1921 it was decided to send me with a surveyor, Wm. Waddell, D.L.S., to the north in a Junker-6 all-metal monoplane. The trip was made from Peace River Landing to Ft. Norman in four hops and in the same number of days. The plane was piloted by Elmer Fullerton, and "Bill" Hill was the mechanic. Being a geologist, I naturally took along with me two cameras and an ample supply of films. Fitted with three-ply mahogany pontoons, our plane took off, and soon we were well on our way down the Peace River, on which the year before, I had taken two barges loaded with freight and men to the far north. Below I could see other "outfits" making their way down the river in the same snail-pace speed, while we sped along at a rate of about 95 miles per hour. The big bends in the river seemed like mere twistings of a garden worm. To our right and left we saw land clothed with dense forests, dotted with countless lakes and traversed by winding tributaries of the Peace River. Forest fires were visible from time to time and my two cameras were kept busy clicking picture after picture. The dangerous Vermillion Chutes slipped beneath us without even a murmur. The roar of these troublesome rapids was drowned by that of our motor. A year before one barge was lost in the Chutes, but this time the laugh was on the churning and frothing waters below.

Soon we reached Ft. Smith situated on the downstream side of the famous Smith Rapids. Here the water of the Slave River dashes, tumbles, twists and roars amid a maze of islands over Pre-Cambrian rocks for a distance of sixteen miles with a total drop of 109 feet. What a satisfaction it was to view this stretch of treacherous water from a height of 2,000 feet. The year before it took us just eight days to navigate

Oblique photograph of the Gravel river.

and portage these rapids with our barges. An account of those eight days of thrills, mosquito fighting, cursing, narrow escapes from annihilation, work fit only for galley slaves, and what not, is a story of its own. The names of some of these rapids, such as "Rapid of the Drowned," "Mountain Rapids," "Cassette Rapid" and the many crosses on the banks of the river at the foot of these mill-races, are enough to make "one's heart turn white" as a homesick Texan remarked.

The sluggish stretches of the Slave River below the Smith Rapids, with their giant meanders and ox-bow lakes below, passed beneath us amid occasional squalls of snow. More pictures were taken. The numerous sand bars that had caused us so much grief and delay with our barges and motor boat were easily discernible beneath the water. What a blessing aerial photographs would be to the pilots of the steamships plying this or any similar sand-bar infested river.

In the distance the faint outlines of that treacherous body of water, Great Slave Lake could be seen, and soon we found ourselves above this inland sea of dark, green icy-cold water. Ice rafts or miniature ice-bergs dotted the surface of this remnant of the Pleistocene glacial period. We virtually skimmed over the surface of this green, transparent water at an elevation of about 100 feet and at a speed slightly over 100 miles per hour. The year before, by the Grace of God, we sneaked along the south shore for seventy miles and thence across this "big pond" to Wrigley Harbor, fifty more miles, to the source of the Mackenzie River, in about sixteen hours. Those were about the longest sixteen hours of my life. One little squall would have spelled just one more crew of amateur sailors gone to their reward. This time the same distance was covered in about one and one-half hour with a fairly severe snow storm awaiting us at Wrigley Harbor where the monarch of the north—the Mackenzie River—has his source, and takes the excess waters of Great Slave Lake on their long but swift journey to the Arctic Ocean.

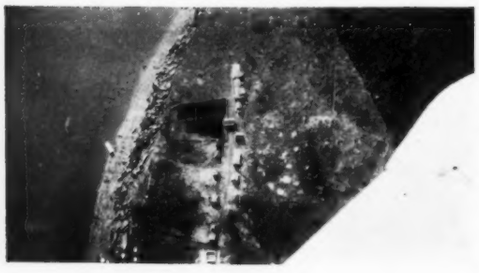
Down the mighty Mackenzie we sped, taking snaps of the river ice piled high along the banks. The ice break-up had occurred only three weeks previously and the action of this river ice is comparable to that of a small glacier. It plows, gouges, scratches and churns the rock and debris along the banks of the river very much like a true glacier, only much faster. A forced landing below Ft. Simpson necessitated our "tying up" on one of these banks of piled up river ice. In places it stood 60 feet high.

Inside the eastern rim of the Rocky Mountains we followed the trail blazed by this impressive river, whose mission is to cut these mountains to sea level. Near Ft. Wrigley we flew at about 1,000 feet above the river with high mountainous walls on either side. Echoes from these walls gave us double and triple assurance that the motor was functioning perfectly. As our load became lighter, due to the consumption of gasoline, we rose higher and soon found ourselves more than 4,000 feet above the river. What a panorama those snow-capped Rockies presented! We were looking at the "land where the mountains are nameless and the rivers run, God knows where." We were winging our way over the "Trail of '98" where many a brave heart met disaster with the faithful dog-team.

Far off to the northeast we saw clearly Great Bear Lake, still silent and covered with solid ice. From it flowed the river with the same name, carrying huge blocks of ice to the Mackenzie River. Even its upper stretches were still ice-bound. Ft. Norman, our destination, could be seen clearly at the Junction of the Great Bear and Mackenzie Rivers. It was directly beneath us in no time. More clicking of the camera, first on this side, then on the other, as the pilot banked to bring us down. The great Mackenzie was waiting for us. For our benefit he greeted us with a surface as smooth as glass. It was too smooth. He had overdone it. Not a ripple, not even a piece of driftwood was discernible. The last banking turn had been made; and with the engine shut off we were gliding gracefully, swiftly, and joyfully toward this well-meant smooth surface. It was like a mirror. The pilot realized it, "gave her the gun," but too late. A slight bump, a swishing noise, and the right pontoon crumpled like an eggshell. What a laugh the Mackenzie must have had! What a trap he had laid for us! The giant silver-winged bird came to rest with the right wing tip in the water. In no time we were out of the cabin on the left wing—but, before doing so, I carefully placed my cameras and films on the left side which would be submerged last. In a frantic effort to keep the right wing from filling with water, we cautiously climbed to the end of the left wing like drowning men grasping at a straw—but to no avail. The question was, "would the right wing touch the bottom of the river, or would we tip over completely?" The right wing

Snapped while crashing into the Mackenzie river. The ice is piled 50 ft. high on the banks.

We crashed into the Mackenzie river three minutes after taking this photograph.



did reach the bottom after we had been tilted to an angle of about 60 degrees. All this happened in mere seconds of time. Then we climbed down to throw ropes to our rescuers who finally managed to reach us in canoes, after climbing through the ice piled 50 to 60 feet high along the bank of the river. It seemed like ages before they reached us. It was just in the nick of time because we were swiftly drifting toward deeper water—ice-cold water! The laugh was, after all, on the Mackenzie. If the water had been only a few feet deeper this article would not have appeared in WORLD PETROLEUM.

Only three out of the twelve rolls of films were slightly water-soaked, but these were not damaged enough to prevent indicating to me, after their development, that aerial photographs are of tremendous values to the geologist. Some of the pictures taken on this eventful trip are reproduced in this article. That was the initiation of aerial photography in my work.

After the damaged wing had been repaired with empty motor spirit tins, and the plane fitted with a new pontoon, we took a combined trial and scouting trip over the area which had been surveyed by me during the previous seasons on terra firma. In an hour's time we flew over inland points which required weeks of time to reach by plodding through dense scrub spruce and muskeg swamps. The views from the plane gave me a much better and comprehensive idea as to the structure of the rocks. If aerial photographs had been available on the previous occasions the amount of work accomplished during three seasons of hardships—which cannot be adequately described—could have been completed in one season quite easily, and more accurately.

Over Tropical Jungles

MY next experience with aeroplanes was in the tropics of the coastal area of Colombia, South America, (1923-25). Almost two years of detailed geological mapping had been done on foot and mules. Most of this area was accessible and outcrops were numerous, but the structure was complex. There were several places where dense tropical growth or thorny scrub vegetation made penetration on foot almost impossible. As is usually the case, on one structure an easily recognizable sandstone ledge disappeared abruptly into a densely tree-covered group of hills. What looked very much like this same sandstone had been observed and mapped at an isolated outcrop. It seemed unreasonable to find it there, and its connection with the other outcrops made it necessary to postulate, as is frequently done, the much abused fault. As fortune would have it, I had occasion to fly directly over this critical area twice on trips from Barranquilla to Cartagena. The view from the plane left absolutely no doubt in my mind as to the structural relationship between these standstone outcrops. An aerial photographic map of the area would have answered the same purpose.

We lost a barge running these Vermillion Chutes on the Peace river in 1920. The ledge is of Paleozoic limestone.

The following year my work carried me 400 miles inland up the Magdalena Valley. Detailed geologic mapping was there carried on in the real, honest-to-goodness, tropical jungles. The cutting of trails through these apparently impregnable forests, comprising tremendously large trees woven together by tangling and thorny vines, as well as annoying underbrush, was by itself a problem. Our party of four gringoes (two geologists and two plane-table men) was served by twenty to thirty natives and eight to twelve mules. Slowly we made our way through virgin forests, mapping and geologizing as we went. Here again aerial photographs and maps would have helped matters considerably. Plane-table traverses had to be run up all the small creeks ("Quebradas" in Spanish) and this could not be done before the natives had cut away the underbrush, vines, and palm trees usually found in these stream beds. Aerial photographs would have helped us, not only to plan things ahead, but would have served to correlate outcrops from stream to stream by the aid of the jungle-covered ridges.

There is no doubt whatever that aerial photography has already, and will in the future, be of great aid in exploratory work, not only in the Tropics and the Arctic, but any place where geologic conditions are suitable to such mapping.

Plant ecology, which means the sociology or association of plants, plays an important part in geological mapping. The recognition of distinct groups or rows of trees on different soils, caused by outcrops of different geological formations or individual beds, is an easy matter from aerial photographs. Likewise different formations give rise to variously colored surface soil, and by means of color filters on the aerial camera, very slight differences in color can easily be detected on aerial photographic maps taken in arid or semi-arid regions. Due to this the geological mapping of desert areas has been made possible. These slight differences in color cannot be detected when too close to the ground and in the glaring sunlight of the desert.

Passing over the Lower (Louise) falls on the Hay river, which is completely frozen.

I could go on enumerating how aerial photography has become an almost indispensable tool for the geologist; but, the remainder of this article consists of a brief outline of how aerial maps are made. A great deal of this data was gathered during 1929 when Western Canada Airways Limited undertook to map about 1,000 square miles of Foothills territory in Alberta for the Imperial Oil Limited. During the progress of this work I had occasion to make several flights while the photographing, from an altitude of 16,000 feet, was being carried on. The snow-capped Rockies, as viewed from an altitude of

16,000 feet, present one of the most impressive sights I have ever experienced. Like a series of white caps or breakers, frozen in their tracks, this mountain range was spread before our eyes for scores of miles.

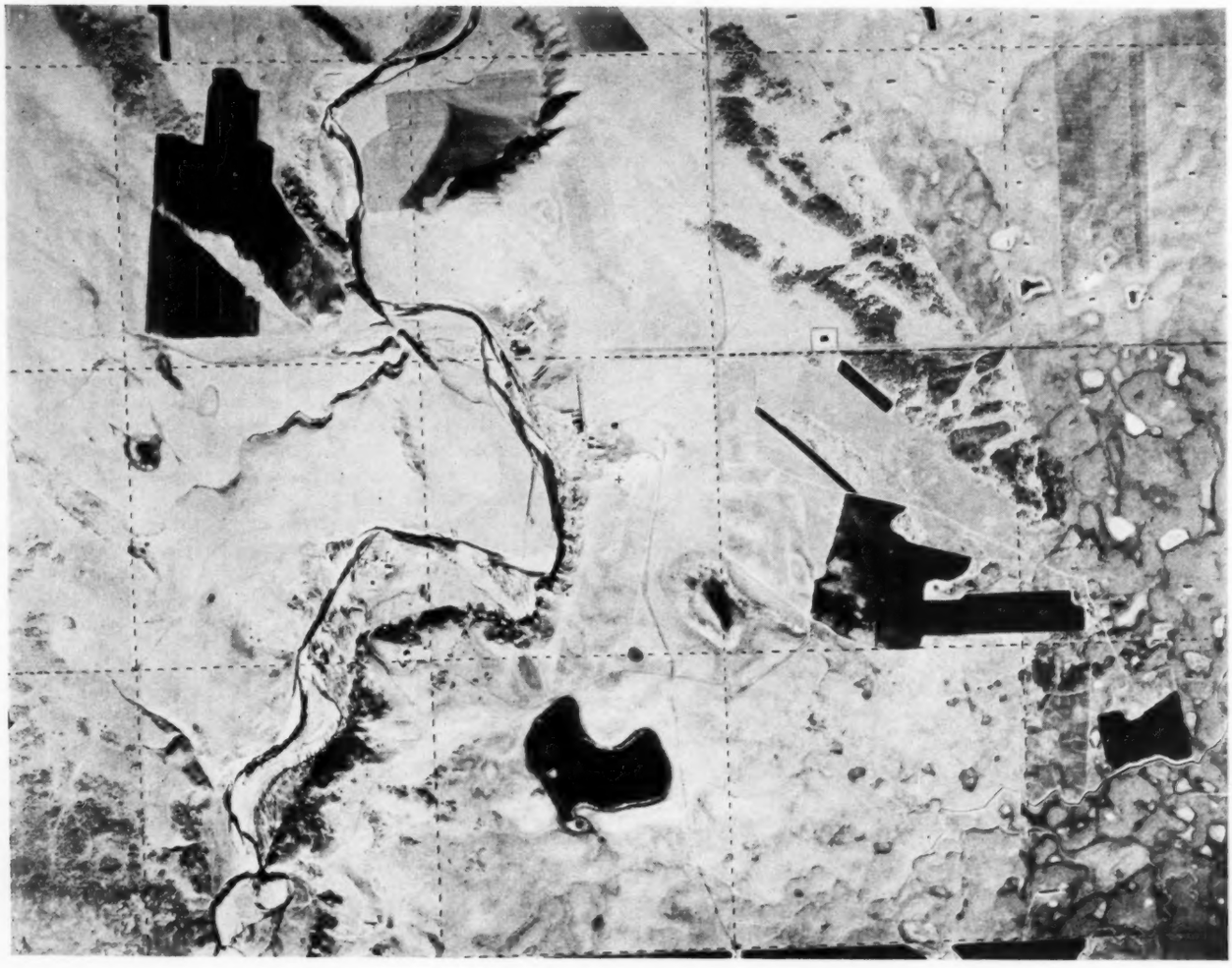
Method of Procedure

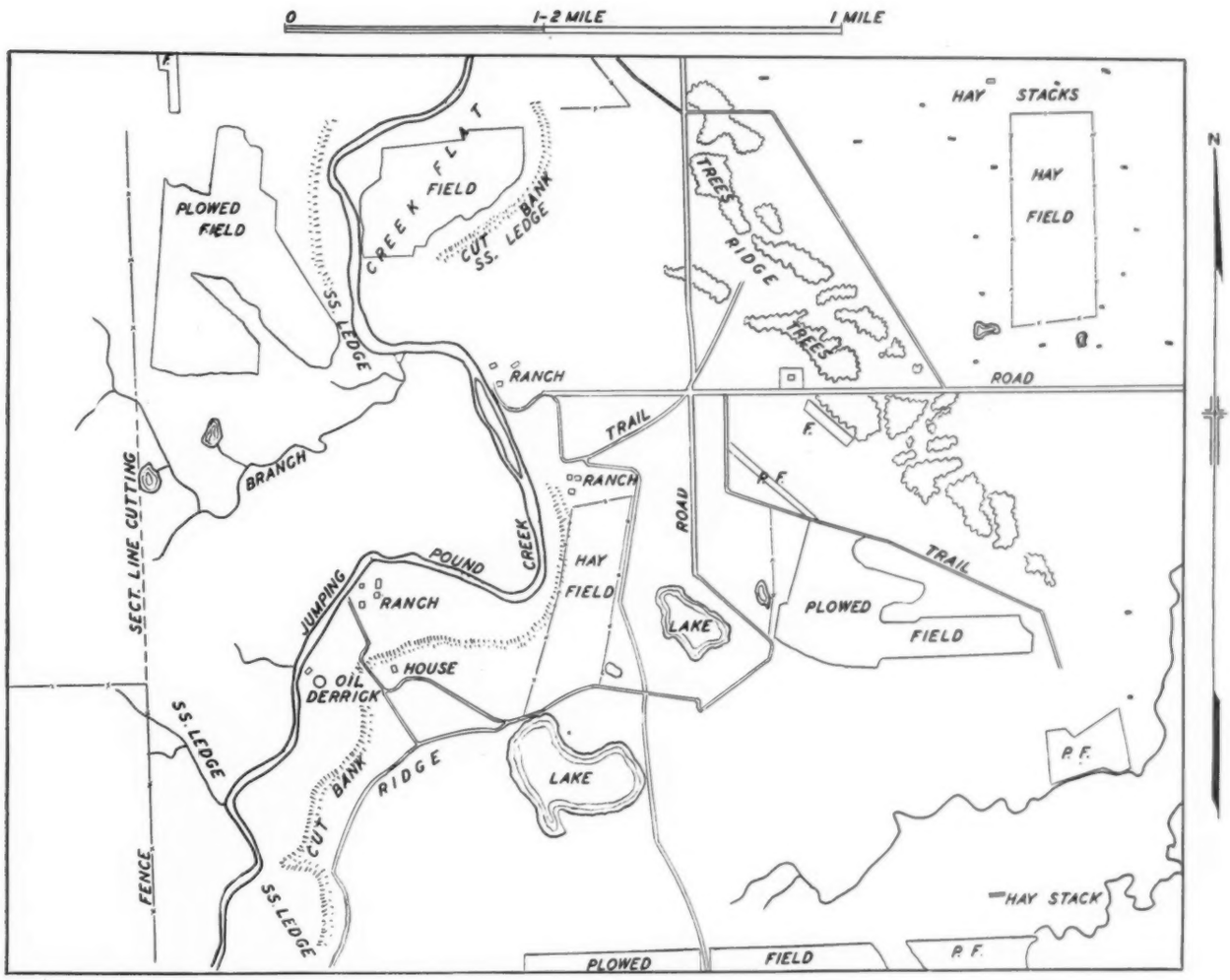
AERIAL photography is a science dependent upon the closest co-operation between several independent departments, namely:—the surveying branch, the aviation branch, the photographic department and the map-making department. If one of these falls down on the job, unsatisfactory results are to be expected. If the pilot of the plane is unable to fly his machine along a true course at a reasonably constant altitude the best photographic work will be of little use. On the other hand, if the pilot has completed his work in a perfect manner, poor photography will ruin all his painstaking efforts. These difficulties will be brought out more clearly as we proceed with this article. There are two kinds of aerial photographs which may be employed in map making:—*oblique* and *vertical*. The latter are the most commonly used and give the best results from a scientific and practical standpoint. If the camera is pointed through a hole in the floor of the plane straight down at the landscape, so that the focal plane (the film or plate) lies parallel to the surface of the earth which is being photographed, a *vertical* aerial photograph will be the result. This amounts to nothing more than a map of the area in question.

An *oblique* photograph is one in which the film or plate of the camera lies at an angle with respect to the surface of the earth which is being photographed. In a picture of this kind the various objects will necessarily be distorted and the results is not a true map of the area photographed. Oblique photographs bring out the relief of an area, i. e., mountains, valleys, trees, houses, etc., much more satisfactorily but not in true perspective. They are the most popular for illustrating the general appearance of an area. With the aid of a stereoscope the relief in its true proportions can also be observed on vertical photographs. The principles involved in this method are exactly identical and give the same result as those employed in the hand stereoscopes which used to adorn the table with the family album in our grandmother's *sanctum sanctorum* —the parlor.

In mapping by means of aerial photographs the usual routine procedure is the same for any area, but each locality requires originality on the part of the

Vertical photograph from a height of 16,000 ft. It is essentially a map of the area below. For the same map drawn, see following page.





This is a map of the area illustrated in the vertical aerial photograph on the previous page.

pilot as well as of the photographer to cope with local problems and conditions such as average ground level altitude, abundance or absence of lakes, wooded or open country, etc. Let us assume that an area, previously surveyed in the usual fashion, is to be mapped aerially. The available maps are studied, land marks are spotted such as lakes, villages, prominent hills, river courses, etc., etc. A grid outlining the proposed flights running north to south or east to west, as the case may be, is drawn on the map. The pilot then makes one or more test flights (reconnaissance trips) to acquaint himself thoroughly with the country. He actually rises to the height from which the photographs are to be taken and makes trial flights up and down the outlined course and thus gets himself thoroughly acquainted with the landmarks which he must use as guides for direction and he also studies the ground for possible forced landing fields. Obviously the scale of the photographs is dependent upon the focal length of the lens and the height from which they are taken. The vertical photographs illustrated in this article were taken from an average altitude of 16,000 feet above sea level and resulted in a scale of about 4.3 inches to the mile. They have been reduced for illustration in this article.

After the reconnaissance flight has been made the aerial camera is mounted in the cabin of the plane and photographing begins. A large view finder made of ground glass is also installed pointing through the cabin floor. An aerial camera is very much like the ordinary camera but it is much larger and stronger, and adapted primarily for aerial photographic work. The Fairchild K-3 camera is the most popular in use today. It is loaded with roll films of one hundred exposures and mounted so that it will remain horizontal even though the plane may be slightly tilted. The camera can be operated by means of a crank or electrically so that after each click of the shutter the film is turned for the next exposure. In order to make a complete aerial map of a region, it is necessary to take the pictures so that they adjoin one another.

Usually the time between each exposure is so arranged that the adjoining photographs overlap. If this is done the pictures may be joined nearer their centers where there is less distortion, and the over-lapping parts of two adjoining pictures may be studied with the stereoscope. Thus the actual relief of the country is brought out and may be examined in true proportions. The customary practice is to effect a 60 per cent overlap so that all parts of the area may be observed and studied stereoptically. By means of head phones or an electrically operated signal system the

pilot and photographer are in constant communication during the process of surveying photographically from the plane. After flying and photographing along one of the lines of the grid the plane is swung around over onto the next line a mile or so distant, depending upon the scale used, and thus the process is repeated. This goes on until every part of the entire area outlined has been photographed. The photographer of course, is constantly observing through the view finder and must regulate the time between exposures, change film rolls, etc.

After the first photographic "mission" has been completed the films are developed and contact prints are made. If for any reason the results are poor the work has to be done all over again. For this reason it is important to have the developing of the films and prints done immediately after the first flight in order that any errors in the use of filters on the camera, incorrect exposures, incorrect time between exposures, or other possible mistakes can be corrected before too much of the work has been done. It costs plenty of money to send a high powered plane up to a height of 16,000 to 18,000 feet and keep it up there for periods from four to six hours. In addition to that the films used are also very expensive things to waste on incorrect exposures. While taking the pictures, exposures are made in many cases every 25 seconds or even less. At that rate a great deal of the high-priced film is consumed during the course of an hour. Atmospheric conditions such as intensity of haze, etc., determine what strength of color filter to use on the camera. During cloudy or foggy days, or when distant forest fires cast their veil of smoke over an area, no work can be done. Delays caused by such conditions add materially to the cost of aerial mapping.

It may be of passing interest to note that recently Captain A. W. Stevens of the U. S. Air Corps photographed* Mount Rainier, in southern Washington, from a point located at a distance of 227 miles away, from a plane at an altitude of 17,000 feet in south central Oregon.

Due to the ever present haze which prevents the naked eye, or one aided by telescopes, seeing such a great distance, it was necessary to make the exposure on a specially treated film through a yellow and red filter. This remarkable feat in photography, namely, taking a picture of an object not visible to the eye, is only one of the many recent developments in aviation as well as photography, or "Aerial Photography."

During the process of mapping, each roll of one hundred films is marked and after development each negative receives a number. In this way no mix-ups will occur.

The next step is the fitting together of all the prints to make a rough "mosaic" map. If the pictures were taken at essentially the same altitude the prints will all be on the same scale. This is rarely the case for a large area, and must be corrected by either enlarging or reducing the prints to a common scale. Assuming that this has been done, construction of the mosaic map may begin. This is a slow, tedious job which requires great care and an abundance of patience. The exact manner of procedure varies, but all it amounts to is a matching together of adjoining prints with the aid of two or more common points. In areas of great relief (difference in elevation) distortion is a big factor and causes some trouble in matching up prints. If a map of the area in question is available the construction of the composite or mosaic map is made much easier and the true scale is easily determined. In absolutely unexplored territory the whole job, from flying down to matching up prints and determining the scale, becomes much more difficult.

The above outline although aided by the illustrations is a very sketchy affair. There are scores of technicalities too numerous to mention in an article of this kind. Those who are more deeply interested in this subject would find the following reference worthy of their time. "Applied Aerial Photography," by A. C. McKinley, published by John Wiley and Sons, Inc., New York, 1929. In this book one will find the subject well treated and adequately illustrated.

As a closing remark I might add that aerial photography has not, and probably never will, replace accurate ground surveying. The two methods, when employed together, will give maps showing details far superior and much cheaper than those based wholly upon ground surveys. In certain instances it is obvious that ground surveys will answer the purpose entirely, while in other instances it would be folly to do anything else but aerial surveying. It all depends upon what features are sought and how accurately they are wanted on the map.

* Aerial Photography by Infra-Red Rays, Scientific Monthly, August, 1930, pp. 185-7.

▼

Petroleum Production in Alaska, 1930

All the petroleum produced in Alaska in 1930 says the U. S. Department of the Interior, continued to come from wells of the Chilkat Oil Co., near Katalla, where, in addition to the oil wells, the company operates a small refinery. The gasoline and distillate produced from this petroleum are much in demand in the local market.

A revival of interest in the development of the oil fields near Katalla and Yakataga was shown by reports that several companies were making preparations for active drilling in these regions, and some were actually shipping in the necessary equipment. In addition to well justified attempts to extend the area of known oil lands in this part of Alaska there appears to have been considerable speculative promotion whereby individuals have been induced to pay many thousand dollars for services in obtaining oil holdings that could have been obtained directly from the Government at a nominal charge. In their initial stages it is difficult to distinguish between the worth while and the fraudulent promotion schemes, so that actual performance in the field must be watched closely before deciding into which class any individual project falls. That there is some oil in this region is clearly proved by the producing wells near Katalla and by the numerous seepages at many points between Katalla and Yakataga.

Drilling for oil in the region west of Chickaloon was continued by the Peterson Oil Association.

No search for oil by drilling is reported to have been in progress in any of the other parts of Alaska that are believed to hold promise of being oil-bearing, such as the Alaska Peninsula or the naval petroleum reserve in Northern Alaska. The proving of a new oil field in Alaska is an extremely expensive task, which can be undertaken only by a large, strongly financed company, and that such companies at present find more certain promise of immediate returns in other fields.

Petrol Distribution in Great Britain

Four Groups Control Marketing. United States Supplies 61 Per Cent and the Caribbean 7 Per Cent of Motor Spirit Imported. Annual Consumption 25,000,000 Barrels . . By Alec. H. Day

AT the present time Great Britain represents the most valuable market for America's vast surplus of motor spirit, fuel-oil, crude and lubricants, the exports of which last year exceeded 156,660,000 barrels with a sales value of over $450,000,000. In fact the United States furnished 61 per cent of the gasoline consumed in Great Britain; but there are indications that this ratio may be changed very considerably if a tariff or embargo be placed on American imports, due to the major output of South American crudes and refined products being diverted to world markets, particularly to Great Britain.

BRITISH motor spirit, or petrol, distributing methods, like those in most civilized countries, have undergone many changes since the commodity first began to assume commercial importance at the end of the nineteenth century. Pioneer motorists first obtained their supplies of fuel as best they could, either in 40 gallon wooden barrels or in heavy cases, each containing four two-gallon tins. The development of the motoring habit, however, soon brought in the "can period," during which single cans of definite brands of petrol became the normal method of taking supplies both for private and commercial cars. During the past decade the can has practically disappeared and although cans are still used for carrying small emergency reserves of petrol, the road-side pump is almost universally used for filling. The change from the haphazard purchases on the initiative of the motorist himself to the widely advertised pump distribution of today has been revolutionary, but has done no more than keep pace with the increase in the use of the automobile. The extent of this increase over the past eight years is shown as follows:

Motor vehicles registered in Great Britain and Northern Ireland on August 31.

	1922	1929	1930
Passenger cars	314,769	970,275	1,042,258
Motor cycles	377,943	705,025	698,878
Freight vehicles	150,995	318,253	334,237
Taxis, busses and other vehicles for hire	77,614	95,798	98,865
Others	31,153	41,277	43,371
	952,474	2,130,628	2,217,609

The increase in petrol consumption over a comparable period is shown below:

	1922	1929	1930
Barrels	8,000,000	24,000,000	24,800,000

About 89 per cent of the 950,000,000 Imperial gallons total annual consumption in Great Britain consists of petrol imported in a refined state. The greater part of the remainder is the product of imported crude, although some spirit is distilled from the shale deposits in Scotland and elsewhere. Among the principal British refineries are those of the Anglo Persian Oil Company at Llandarcy and Grangemouth, the Royal Dutch-Shell plant at Shell Haven, and the London and Thames Haven Oil Wharves plant at Thames Haven. The Agwi Petroleum Company, controlled by the Standard Oil Company (N. J.), has a large topping and refining plant near Southampton. Other installations of considerable size are located at Barrow-in-Furness, Manchester, Hull, Isle of Grain, and Killingholme, near Hull.

British imports of petrol are derived principally from the United States, a recently issued official statement giving the following sources of supply.

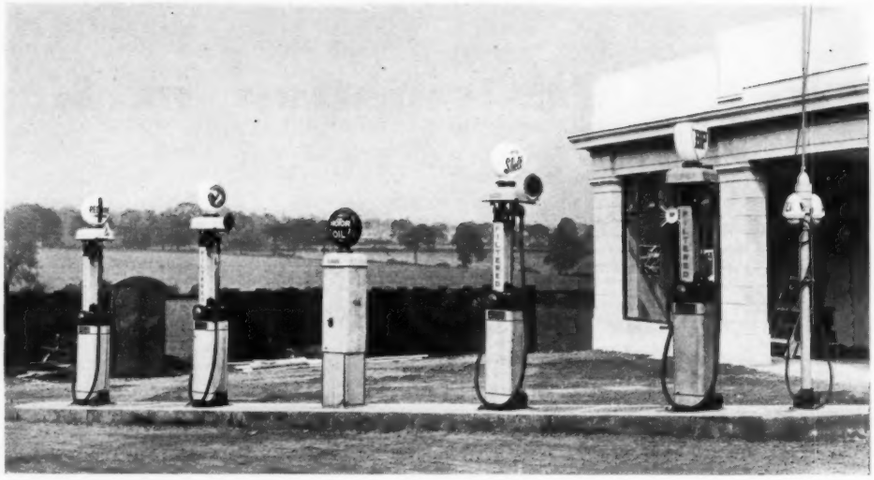
U. S. A.	61	per cent
Persia	7½	per cent
Caribbean	7	per cent
Russia	6	per cent
Dutch East Indies	3½	per cent
Roumania	2	per cent
Trinidad	1	per cent
Mexico	1	per cent
	89	per cent
U. K. production & refining	11	per cent
	100	per cent

Well designed gasoline station in London. Note flower baskets.

The principal shippers from the United States are the Anglo-American Oil Company, controlled by the New Jersey Standard, and handling its products, and the subsidiaries of the Royal Dutch-Shell group. The latter are also largely responsible for the imports from Curacao, where Venezuelan oil is refined in the largest petroleum refinery in the world.

Statistics published by the British Board of Trade show that London handles a very high proportion of the total petrol imports. The latest figures available, those for 1929, indicated a percentage of 44 unloaded at the Port of London, Manchester coming next with 14 per cent, with Hull Bristol, Southampton and Liverpool all taking between five and ten per cent. Swansea, Glasgow, Plymouth, Barrow and Newcastle each took between one and three per cent of the aggregate. The absence of any large intake approximating to the largest Anglo-Persian refineries is, of course, due to the fact that a large part of that company's imports consist of crude, which is refined in this country. Persia is estimated to have supplied about 75 per cent of the total crude oil imported into Great Britain during the past five years. The big Anglo-Persian topping plant at Abadan, Persia, has just had some cracking units added, which will increase its motor spirit output.

From their arrival at ports in Great Britain, all low-test petroleum products are subject to stringent regulations by the Board of Trade and by local authorities as to unloading, storage and handling. There are still in existence a few ocean depots and inland storages which would probably not be permitted to be erected in present day circumstances, but the great majority are so designed and placed as to meet modern requirements.

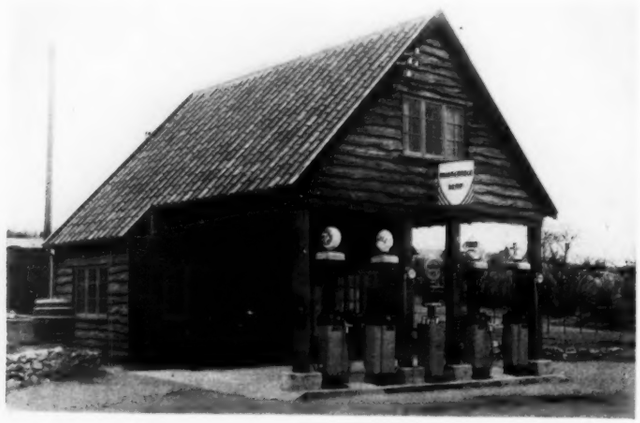


Modern filling pumps on a country road.

The usual ocean intake and storage station consists of groups of tanks at not less than 50 feet apart, each group having a capacity of from 15,000,000 to 35,000,000 Imperial gallons, which measurement is one-fifth larger than the U. S. gallon. Each block of tanks is isolated by a considerable area of land, and also by containing walls to minimize fire risks. The usual pipe installations connect the blocks and the tanks in each block. Owing to the excellence of British roads and the special formula demanded by law for calculating motor taxation, the British motor industry has concentrated largely on the production of cars with a small but highly efficient engine. The requirements of such engines call for considerable attention to blending of motor spirit after arrival at the ports.

It is estimated that about 90 per cent of the petrol distributing business of Great Britain is in the hands of an association of four companies. This "combine" consists of the Anglo-American Oil Company, representing Standard Oil Company (N. J.) interests, British Petroleum Company, the distributor for Anglo-Persian, Shell-Mex Limited, a subsidiary of the Royal Dutch-Shell group, and Russian Oil Products, which markets supplies from Russia. "Russian Oil Products, although not officially a member of the combine, has a price fixing and quota arrangement with it, and for purposes of this article may be considered as part of the association of marketing companies." These companies control the price and maintain highly effective distributing organizations, using coastal steamers, canal boats, rail tank cars and road tank wagons. Their distributing organizations all appear to work on a somewhat similar plan. The small independent distributors, handling the remaining ten per cent of the total petrol consumed, naturally have less systematic methods owing to the large outlay required for the establishment of inland depots and the installation of pumps at garages.

A description of the organizations maintained by the big distributors will show why the smaller independent operators have little chance of success outside their own local areas. The four members of the combine have large storage and distributing depots at nearly 1,000 stragetical points throughout the country. Sites for these depots, which vary in size according to the locality, have been selected after careful planning as to current and prospective requirements and the possibilities of transport development. The depots draw their supplies by road, rail or barge from the ocean storages or refineries. Where conditions permit, the tanks are above ground to enable gravity filling of wagons and rail tanks. Municipal regulations, however, are particularly strict in this respect, and tanks within certain areas, especially those in



Country side filling station in Somerset, England.

close proximity to railway stations or congested living areas, have to be sunk below ground level. Depot tanks vary in capacity from 10,000 gallons to 60,000 gallons, whilst the number of tanks comprising a depot differs considerably, some depots having a dozen tanks and others only one or two.

Each depot has attached to it the necessary equipment for distribution to retailers, including road tank wagons, and in many cases, rail tanks. Barges and coastal steamers are used in cases where water transport is possible, and are often the regular means of taking petrol from one big depot to another.

In addition to having charge of all sales within the territory allotted, the depot attends to the collections of accounts, the installation of pumps for garage proprietors, and similar matter —acting in fact, as an independent sales agency for the company which controls it.

The companies estimate that more than 50 per cent of their total sales is made to commercial users. This business is often arranged through the depots, generally consisting, in the case of large fleets of motor-coaches or busses, of the installation of a pump on the premises of the consumer.

Outlets for petrol to the private consumer are in the hands of independent retailers. Generally speaking, the combine companies do not operate filling stations, and even when they do so they appear to take considerable care to avoid any appearance of competition with the established retailer. The few exceptions to combine-owned filling stations are those maintained at a few spots for supplying commercial vehicles.

Filling land tank from rail tank car.

The privately-owned retail petrol station, drawing its supplies principally by road tank wagon from the depots of the big companies, is largely engaged in supplying the private motorist and the "casual" trade for commercial vehicles. Great Britain is relatively thickly populated, and with about 14,000 pump stations, possessing some 50,000 pumps available for the supply of the leading brands, the motorist seldom finds himself out of touch with supplies. The average annual delivery per petrol station pump in Great Britain is estimated at between 5,000 gallons and 6,000 gallons.

The question of inland transport charges is an all important one for the petrol distributing companies, since it enters largely into the total cost of the commodity. For railway transport purposes, petroleum and petroleum products fall under the general classification of "dangerous goods" and are subject to special regulations regarding carriage. There is a standard tariff with the customary lowest ton-mile charge for the longest haul, but the standard rate is only exacted for journeys on which it is not more economical for the oil companies to use road tank wagons. Investigation into the cost of carrying petrol shows that oil companies can accomplish tank wagon hauls by road up to a distance of 60 miles at a cost of just under four pence (eight U. S. cents) per ton, allowing for empty return runs. Standard rates for rail transportation often exceed this figure, and the railway companies make a common practice of quoting exceptional rates, governed to some extent by the amount of general traffic moving, and approximating as closely as possible to the cost of transport by road.

Despite every effort by the railways to get petrol carrying business a large and probably growing proportion of short distance transport of petrol is done by road. One of the considerations encouraging this tendency is the fact that carriage by rail necessitates the cost to the oil companies of constructing and maintaining rail tankcars, which are obviously of less general use, owing to their restricted mobility, than a road tank wagon. Rail tanks in Great Britain carry from 4,000 to 5,000 Imperial gallons, and the most popular size for road tank wagons is 600 gallons, although some have a considerably larger capacity.

By agreement between the combine companies, no bonus or similar benefit may be given to retailers except by general consent. For some time all the combine companies have generally allowed a rebate of one penny (two cents) per gallon on the spirit sold. Each combine company also provides retailers with pumps and storage tanks, for supplying its own particular brand of spirit, on very easy hire purchase terms. The retailers profit margin on combine petrol sold is something like 3d. per gallon, in addition to the rebate. A commercial rate, varying with circumstances, but in general some pence per gallon below the retail price, is charged for bulk delivery to owners of fleets of lorries or busses, always on the distinct understanding that there is to be no re-sale, and contracts of 100,000 to 500,000 gallons are not unusual at these rates.

Typical British bus garage, showing electric filling pump.

In the case of large commercial contracts, bargaining and price cutting between different components of the combine are not unknown. An example of this phase of petrol distribution occurred recently, when, after a "Dutch auction" between representatives of two combine companies and an independent distributor, during which the price quoted was reduced from 11d. to 9½d., per Imperial gallon the 500,000 gallon order concerned was booked at the latter price by one of the combined concerns. The successful tenderer had to bring the supply 110 miles from its nearest depot, while its chief competitor had a storage within 20 miles of the customer. This fact, and

the price, gives a clue as to the name of the successful concern.

Retail prices for petrol in Great Britain are a relatively simple affair, owing to the small area of the country and the large proportion of the total business transacted by the combine companies. Current London ex-pump price for No. 1 spirit is 1s. 4½d. per Imperial gallon, and 1s. 5d. for the rest of England and Wales and Southern Scotland. In certain outlying districts 1s. 6d. is charged, and additions of 1d. or 2d. per gallon are made for delivery in can. Independent petrol, often of inferior quality, is 1d. or 1½d. cheaper than standard brands. Changes in the London price for standard No. 1 petrol during recent years have been as follows:

Date of Change	Price per Imperial Gallon (Brit. Coinage)	(U. S. Cents)
Nov. 1, 1926	1s. 6 d.	36
Dec. 30, 1926	1s. 5½d.	35
March 16, 1927	1s. 3½d.	31
April 4, 1927	1s. 2½d.	29
Aug. 13, 1927	1s. 1½d.	27
April 1, 1928	1s. 0½d.	25
April 28, 1928	1s. 4¾d.	33½
March 1, 1929	1s. 6½d.	37
Sept. 23, 1930	1s. 4½d.	33

Since April, 1928, quotations have included the 4d. (eight cents) per gallon petrol tax.

An interesting analysis of retail prices and costs was prepared in 1929 by the Anglo-American, British Petroleum and Shell-Mex companies in response to an invitation from the government to justify the increase in selling prices announced in that year. The companies stated that prices had previously been below the world level owing to competition by the Russian selling organization prior to the price arrangement with R. O. P. Taking Gulf of Mexico prices as the most reasonable basis, the statement showed that costs per gallon were as follows:

Original cost 5¾d.
Transport and insurance ¾d.
Duty 4d.
Inland dues and freights 1d.
Distribution costs for bulk delivery 2½d.
Total cost, 1s. 2d. per gallon wholesale.

The companies receipts per gallon sold were shown at exactly the same figure after allowing for dealers margin and rebate. It was further pointed out by the companies that maintenance of regular supplies, with blending to obtain requisite quality and uniformity, were considerable advantages to the British community, and that there was no obstacle to competition from any organization prepared to provide equal services.

The statement was generally regarded as a reasonable analysis of the position, although the impression still exists in in some quarters that the United States influence in the combine tends to maintain the selling price of petrol at an unjustifiably high level. No considerable competitor to the combine has appeared, and from all present indications the price agreement between the combine companies appears likely to continue, if only for the reason that no single constituent concern could meet promptly the demand which would develop for its products if it quoted lower prices than the other big companies.

In the matter of filling stations and petrol pumps, as well as in distributing organization, Great Britain is well served. Stations and pumps, indeed, are probably in excess of requirements at the present moment, and there is certainly no economic need for immediate expansion in that direction. Excluding motorcycles, however, there is only one automobile for every 30 persons in Great Britain, which indicates the probability that a period of relatively good business might offer considerable scope for expansion in the total quantity of petrol consumed by increasing the number of cars as well as the mileage per car per years, and by increasing commercial vehicle consumption through increased passenger travel and freight transportation.

Typical Anglo-American Oil Company gasoline station in England.

▼

Soviet Oil and the World's Markets

(Continued from page 215)

oil organization or association in the world. Russia's export surpluses are growing and export surpluses are to be considered pure profits as the home markets pay the main cost, and this as a rule is true not only in Russia.

Consideration may be given to an embargo on Russian oil, but is it practicable? France, whose government is a close ally of Roumania, buys Russian fuel oil for her navy. This year France increased her contracts for Soviet fuel oil by 50%. Publicity against Russian oil as "stolen" has been tried on several occasions without the desired effects, as the case was in Great Britain where the consumer bought it because it was cheaper, regardless of being told that it was stolen. He apparently preferred to leave the moral issue for the Law Lords to decide. One favorable factor in the situation not to be overlooked is that the more rapidly Russia completes her industrialization program the greater will be the quantity needed each year for home consumption. But she must make a certain export petroleum trade in order to pay for her purchases, which include drilling and refinery equipment and foreign engineering skill.

Overproduction, or under-consumption, strenuous competition and other factors have brought about the position where the world's oil industry is trembling on the edge of chaos. To add to the situation Russia is fighting a lone commercial battle—none for her, and all against her. But her position to compete is getting stronger every day, even if her vast program of production and refining is not being fully attained. Ignore this fact if you will, but the question arises as to whether or not it would be a more sensible plan for international oil organizations to endeavor to arrange for a suitable understanding in order to bring about harmonious marketing and profitable prices. The United States with its $500,000,000 income from exports of petroleum products has, perhaps, more at stake than any other nation.

The two wells on the Stearns property for oil injection. Operations were facilitated by lack of competitive wells.

Successful Underground Storage of Crude

Use of Semi-depleted Californian Wells to Store Oil and Gas Results in More and Better Oil Being Available When Wanted. Meanwhile it is Free From Lightning and Fire Hazards.

In the opinion of many prominent oil men the proper place for the storage of "unwanted" crude oil is under the ground, where nature provided a great storehouse. In advocating this policy their thought was to shut-down wells after proving fields, and to eliminate wasteful competitive drilling. A new storage practice, however, is being developed and undoubtedly will find more general adoption where production conditions render its use practical. This is the plan of returning crude oil or topped crude, together with natural gas, to the ground in semi-depleted fields, pumping the oil by pipe line from producing fields having a surplus over demand.

For several years in Persia the oil, after topping, has been returned to the ground together with the gas. Tests have shown that crude produced from such storage systems is of higher gravity when again produced than it was when pumped in. So far as can be ascertained the Union Oil Company of California is the only producer in the United States to utilize older producing wells of semi-depleted character for the storage of crude, although the practice is not uncommon for storing natural gas.

For three years Union Oil has stored with success 13,000,000,000 cub. ft. of gas, and during the past twelve months 750,000 bbl. of oil, in the semi-depleted sands on its own properties in various Californian oil fields. This constructive conservation work is being carried on at the present time, oil and gas produced in one field being transported by pipe line from another. Actual storage work to date has been limited to the Stearns fee holdings in the Brea-Olinda field, near Los Angeles, and to La Purisima wells in the Lampoc field. Operations are facilitated by the fact that lease requirements of the property used for storage do not compel the Company to produce from the re-pressured wells. The oil can, therefore, remain in its subterranean "tank" until such time as it is needed.

Royalties are paid to the lessors when the crude is produced, just as if it had been stored above ground. Not only is the oil stored free from lightning and fire hazards, and loss from evaporation eliminated, but as the result of storage of light crude in heavy oil zones it is possible to recover a larger quantity of heavy oil than would be possible under regular production methods. The light oil, mixing with the heavy, makes the latter less viscous and causes it to flow more readily through the oil sands.

For instance, if a test were now made of the oil at various points of the formation in the Union's Stern holdings where storage operations have been carried on, the oil immediately surrounding the casing of the wells, in which the light oil was injected, would be found to be approximately the same as the gravity of the oil put into the well. A little farther back in the formations, the injected oil being more thoroughly mixed with the heavy oil, would be considerably reduced in gravity. The oil driven to the extreme recesses of the oil zone by the pressure behind the injected oil would be only slightly higher than the gravity of the oil originally produced by the well.

Cleaning out one of the Stearns wells prior to oil injection.

It may be said that the more difficult the problem the more successful and

The sparsely drilled La Purisima field.

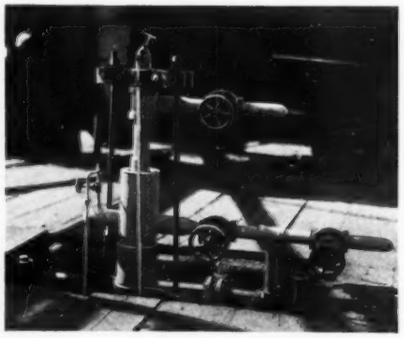
satisfactory is the solution which results. About a year ago Union Oil was confronted with a huge flush production from the deep, high-pressure wells at Santa Fe Springs, California. This followed a long period of overproduction generally that had exhausted all available surface storage. As it happened some previous tests by Union field department and research laboratories had convinced the officials that storing oil underground was entirely feasible. The results of two years' storage of gas, started by the Company in an experimental way at Dominguez four years ago, also had a bearing on the decision to store underground this excess crude from Santa Fe Springs.

The Company's Stearns holdings in the Brea-Olinda field consisting of several hundred acres were chosen as the first storage center. Development of this field was started in 1915, and most of the few wells on the property were completed by 1920. Some 600,000,000 cub. ft. of gas had been pumped in the wells on the property, all of which were then, and still are, shut-in. The oil was carried by pipe line direct from producing wells at Santa Fe Springs to old producers on the Stearns property that had ceased to flow. Four wells were utilized, oil being pumped into three and gas into the fourth, and in order to get equal distribution the wells receiving gas and oil were rotated. The oil was injected into wells through the tubing under a 900-lb. pressure built up by three high-pressure pipe line pumps located at the wells. Prior to the injection of crude and gas the wells were cleaned out.

During the period of the oil injection, covering several months, 500,000 bbl. of oil were pumped into the Stearns wells, and 556,000,000 cub. ft. of gas was added to the 600,000,000 cub. ft. previously stored in the field.

Since storing Santa Fe Springs oil and gas at Stearns, several production tests have been made. Wells that previously produced a nominal amount of oil on the pump flowed at the rate of several hundred barrels a day. The oil pumped from Santa Fe Springs was 34 gravity, while the oil in the Stearns wells was 17 gravity. The oil produced from these wells during the recent production tests was found to be 32 gravity, proving the contentions of those who recommended the experiment that the light oil would diffuse into the heavy oil.

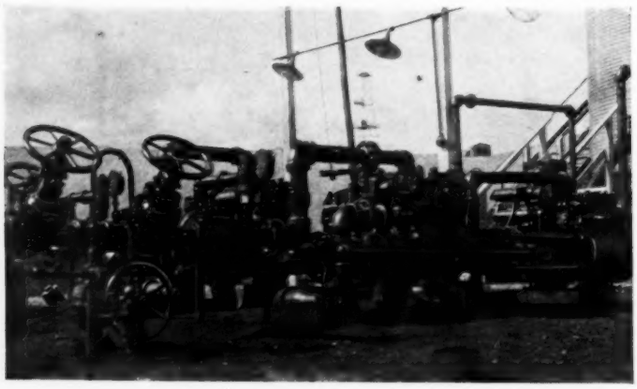
Because of results obtained in storing oil at Stearns, Company officials five months ago approved the storage of oil produced in the Orcutt field. It was decided to inject this crude into wells on the Company's La Purisima property. Virtually the entire structure of the Lampoc field lies within the La Purisima acreage, and Union drilled the discovery well in 1903. Several thousand acres are owned in fee. The two fields are ten miles apart. Oil and gas are carried by pipe line from the producing Orcutt wells to the La Purisima wells. Gas has been stored in this field for a period of about a year, during which time 321,000,000 cub. ft. has been injected into the wells. To date an excess of 250,000 bbl. of oil has been stored. The La Purisima wells, prior to the gas and oil injections, were small pumpers. It has been shut-in since May, 1922, as the 25 wells in the field produced less than 1,500 bbl. Following crude and gas injection they produced during a test from a single well no less than 2,000 bbl. per day.



One of two types of hook-ups used for crude oil injection.

The gravity of the La Purisima oil is approximately 19, while the gravity of the Orcutt oil is 22. To increase the gravity of the injected oil, natural gasoline from the Orcutt absorption plant is pumped into the pipe lines, along with the crude, bringing the combined gravity of the two up to 28.

In addition to the oil and gas being stored at La Purisima at present, Union Oil is storing gas at Santa Fe Springs, Dominguez, Rosecrans and Richfield. The daily storage of gas in all fields totals 13,000,000 cub. ft. Oil stored by the company has been charged against its allowable production in the fields in which it has been produced in accordance with curtailment schedules.



Oil is pumped into the wells by this battery of pumps.

Experts Discuss Production Engineering

Resume of Technical Papers Recently Read Before American Institute Mining and Metallurgical Engineers at Annual Session of Petroleum Division . . By Basil B. Zavoico

THE American Institute of Mining and Metallurgical Engineers held its annual meeting in New York City from February 16th to 19th. The Petroleum Division of the Institute heard a number of papers reviewing the progress of the oil industry in 1930. The more interesting papers presented are reviewed in this summary.

Graham P. Crutchfield discussed Methods and Effects of Unit Repressuring in the Cook Pool, Shackelford County, Texas, indicating that complete cooperation has been available from all operators. The Cook pool discovered in 1926, had in 1927 over 140 wells, with a production of 8,700 bbl. of oil and 7,000,000 cu. ft. of gas per day. Repressuring began in July, 1927, and the return gas reached to date a total volume of 3,750,000,000 cu. ft. Injection of gas was found to be most efficient over the whole area of the field, and not on the highest part of the structure alone. Gas was injected into wells whose original low rate of production indicated a tight sand condition, therefore forcing oil toward more permeable portions of the sand. It is estimated that the recovery with repressuring is fully 100 per cent more than it would have been without it. The field produced to date 9,250,000 bbl., or 8,409 bbl. per acre, and the current potential still is 5,000 bbl. per day.

Kenneth S. Ritchie made a study of the Production Curves for the 8,500 foot Horizon in the Big Lake Oil Field, Reagan County, Texas. The deep wells in this field are continually increasing their production, though in the last half of 1930 the gas-oil ratio began to fall off somewhat. The increase is explained partly by very few completions to the deeper horizon, which even now number but 10.

Eugene A. Stephenson, in discussing the Problems in Proration on the Basis of Gas Energy, finds that the recommendation of J. R. McWilliams is inherently sound, in that it recognizes that the expulsive force which brings the oil to the surface is the differential gas pressure. In detail McWilliams recommends that oil production from any particular pool be prorated on the basis of the total available gas, instead of the method of "potential capacity" of the individual wells. He suggests that each individual operator be permitted to produce a certain volume of gas along with the oil during a definite period, and that it might be feasible to allocate to each operator during any proration period a specific volume of gas for each acre under his control. As an example the Sugarland field in Texas is cited, and the author suggests a program for utilizing gas energy as the basis of proration.

J. French Robinson covered Oil and Gas Production in the Eastern District. He notes that drilling operations were curtailed, due to economic conditions, which in turn reduced production; however, in spite of these conditions there have been a few outstanding developments which surpass anything of recent years. The more important discoveries are those of gas in the State of New York, in Chautauqua, Cattaraugus and Schuyler Counties, the gas being derived from the Oriskany Sand (Devonian). Wells up to 20,000,000 cu. ft. with a shut-in pressure of 1,750 lbs. have been completed.

R. B. Newcombe surveyed Petroleum Production in Middle Western States. It is noted that there was no marked decline in total production of the district, because of the settled nature of its production. The only new flush production field discovered was the Legrande oil pool in western Kentucky, where wells up to 1,000 bbl. initial have been reported from a shallow depth. On the lower peninsula of the State of Michigan two new pools have been discovered (Vernon and Leaton), which are now being developed.

M. G. Cheney covered the Petroleum Developments in Texas, except the Gulf Coast and Panhandle Districts. Aside from increased curtailment of drilling operations and general prorating of production by State authority the most noteworthy developments for the year appear to have been: (1) Demonstrations of the fictitiousness of potentials as shown first by Darst Creek pool, rated at 180,000 bbl. and having actually 78,000 bbl. daily, and especially by the Hendricks pool of Winkler County, with potential of about 1,000,000 bbl. daily in midyear and production of only 52,000 bbl. daily when opened to continuous full production in December; (2) Rapid development of the Darst Creek pool under competitive drilling; (3) Orderly and highly successful development of the Van pool under unit operation; (4) Failure of several highly rated structures southwest and northeast of Van, more than 60 wildcat failures were recorded with the result that the possibilities in Northeast Texas of other producing structures of the large broad domal type like Van appear more and more improbable; (5) Extension of the deep Simpson production at Big Lake and increased interest in these pre-Mississippian pays in North Central Texas and West Texas; (6) Discovery of prolific wells in Rusk and Gregg Counties along the eastern shore line of the Woodbine Sand, portending a rapid and extensive development campaign around the northwest margin of the Sabine Uplift. The main problem of the year was the equitable reduction of production to meet decreasing demand for crude oil.

L. P. Teas read a paper on Petroleum Developments on the Gulf Coast. He stated that although the past year has been one of stagnation, proration and curtailment, the Gulf Coast has measured up to its tradition in the matter of interesting and significant discoveries. Only 2 domes and 7 new structural areas were brought into the producing column in 1930, whereas, in 1929, 13 domes and one structure were added to this list, yet a total of 14 new producing horizons were proved on various domes and structures. On 5 domes new flanks were successfully tested for commercial production. The year 1930 has shown at Barber's Hill that all is not over when the salt or cap is reached. Numerous wells have been drilled through cap, or even salt itself (Salt Overhang), into good producing sands. D. C. Barton in discussing this paper expressed the opinion that probably in the old salt

dome area all salt domes, but one, raising above 6,000 feet, have been discovered with the aid of geophysical instruments; at the present time the surveying is done for deep seated domes, and consequently the time of exploration is very much lengthened. In the beginning of 1930 there were in the field 83 torsional balances and 25 seismograph crews, but at the end of the year only 65 torsional balances and 12 seismograph crews were in active operation.

Henry A. Ley in reviewing Kansas Developments remarked that completions declined to the lowest levels in more than 11 years. The State ranked fourth on the list of oil producing states. The reasonable potential is estimated at 150,000 bbl. per day. The outstanding development of the year was an intensive drilling campaign in southwestern Kansas, which contributed at least 1,000,000 acres of contiguous natural-gas lands to the natural gas resources of the United States. Same author reviewed also the production in Oklahoma.

H. K. Shearer discussed Oil and Gas Developments in South Arkansas, North Louisiana and Mississippi. He indicated that in Arkansas very little activity was noted except for discovery of deep oil production at Urbana, and completion of the first oil well in Miller County. In Louisiana the Zwolle area was further developed bringing production up to about 10,000 bbl. per day.

B. E. Parsons presented a paper on California Developments. It is stated that under the curtailment programs in Effect, the State's production of crude oil for the year was reduced 22 per cent under the production of 1929, and even slightly under the production for the years 1927 and 1928. Important field developments in the State during 1930 included: (1) Discovery of high gravity oil in Temblor sands in the North Belridge field; (2) Discovery of normal high gravity crude oil in the Kettleman North Dome field; (3) Development of deep zone extensions in the Long Beach field; (4) Development of production at Playa Del Rey field in excess of 48,000 bbl. per day; (5) Development of westward extension of the Elwood field into the Pacific Ocean. Continued improvement in the technology of drilling and production has been observed. The Standard Oil Co. of California's No. 1 Mascot, near Taft, the deepest hole in the world, was drilled to a depth of 9,629 feet in April, 1930, and a string of 5⅜ inch casing was cemented at about 9,350 feet. Wells are being pumped successfully just short of 8,000 feet, and pumps operating at 7,500 feet are common. Gas injection in partially depleted zones has been practiced in several fields with beneficial results.

W. E. Hubbard and H. E. Crum reviewed Texas Panhandle Developments stating that little has occurred during 1930 to change the outlook for future production. At such a time as development is warranted, the known pools and defined trends of production will be extended with full confidence of finding commercial production. The total production (ultimate) from the Lower Permian and the Upper Pennsylvanian in the present oil-producing counties should be between 750 and 900 million barrels.

Valentine R. Garfias discussed the Mexico Developments. The production in Mexico declined in 1930 to 39,600,000 bbl., or 5,188,000 bbl. less than in 1929. Wildcat exploration was not successful during 1930. The number of completions declined to 148, as compared with 214 in 1929 and 371 in 1928, the percentage of producers being 49, as against 47 in 1929. 1931 production is estimated at 35,000,000 bbl.

C. W. Hamilton reviewed Venezuela Developments stating that the production was stabilized, the country producing 137,424,000 bbl. in 1930 as against 137,739,000 bbl. during 1929. During the year, three new fields entered into commercial development: the Rio Tarra field in the District of Colon, State of Zulia; the El Mene de Salto field in the District of Acosta, State of Falcon and the Quiriquire field, District of Piar, State of Monagas. Of the 2,555 wells which have been completed in Venezuela, 1,571 wells were in production on January 1st, 1931. The status of these present producing wells may be classified as follows: flowing 652, pumping, 170, gas-air lift 193 and closed-in 556. Provided the present rate of production continues throughout the year 1931 without marked change, the total crude production in Venezuela will be substantially less than in 1930. It is anticipated that drilling completions will abruptly decline both in proven territory and exploratory.

Basil B. Zavoico in reviewing the Russian Situation stated that the Oil Industry in the Soviet Union closed the 1929/30 operating year fulfilling its assigned program, producing 124,000,000 bbl.,† as compared with 96,800,000 bbl. in 1928/29 operating year. In the same period of time, however, no basic improvements have been noted within the industry. A careful study of the conditions indicates that disorganization in most branches continually increased, that supply and transportation are approaching a state of breakdown, that labor problems become increasingly difficult, and that the estimates for 1931-1933 are excessive, 1933 plans calling for 330,000,000 bbl. The author's estimate for 1933 is 235,000,000 bbl.

Ionel I. Gardescu discussed the Rumania Developments, stating that during the Summer of 1930 the daily average production in Rumania achieved a new peak of 128,000 bbl. per day, while the potential production in September, 1930, has been estimated at 235,000 bbl. per day. The curtailment of production was prorated per company, based on its total estimated potential production as of September, 1930, and not per field; as a consequence, at present, there is little development of protected or slightly productive areas.

James Terry Duce in reviewing the Petroleum Activities in Colombia stated that there were no important changes in the producing situation in 1930, because the emergency bill passed by the Colombian Congress in 1927 is still in effect, and therefore no change has taken place in the law governing petroleum. The new bill, now under consideration, has certain objectionable features, but before being passed it may be substantially modified.

Fred B. Ely discussed the Petroleum in the Dutch East Indies. The producing islands now include the Sumatra, the Borneo, the Java and the Ceram. The production during 1930 reached 45,705,848 bbl.,* of which total the Royal Dutch produced 36,006,079 bbl. and the Nederlandsche Koloniale Petroleum Maatschappij (Standard Oil Co. of N. J.) accounted for 3,867,769 bbl. In addition to producing fields there is very considerable prospective area in the Dutch East Indies, particularly in Sumatra, Celebes and the east coast of Borneo, which may have possibilities of yielding fields that would have a material effect upon the production. There is, however, very little chance of the immediate increase in production being marked, unless the policy of the Dutch government changes in regard to the granting of oil concessions. Even though new pools may be found on some of the concessions recently granted, since development is controlled by one company, there is little likelihood of production being forced beyond market requirements.

The review of economic papers will be made in the April issue.

† Russia's 1930 calendar year official production figures are 129,955,417 bbl. on a conversion basis of 7 bbl. per ton.

* Official figures for Dutch East Indies for 1930 are 38,722,250 bbl., on a similar conversion basis. —Editor.

Salt Domes of North Germany

Influence on Formation and Concentration of Petroleum Denied. Resumé of Paper Read Before Institution Petroleum Technologists, London.

Resumé By Roderic Crandall

Crandall & Osmond
Petroleum Engineers, New York.

DURING the past year Germany jumped to the million barrel class of crude-oil producers, and modern American methods recently introduced are likely to make her an important oil country before long. Had present scientific knowledge and drilling methods been available prior to the War, the results of the great conflict might have been quite different. The scientific findings as regards the non-influence of salt domes on concentration of petroleum in Germany are of interest at this stage of the development.

JAMES ROMANES, F. G. S. in a geological paper read in London recently, points out that the North German plain is part of the Permian basin which contains the largest salt deposits in the world. This basin extends from Eastern England, across Holland, Germany and Poland, into Russia. The English equivalent of the salt series is the magnesian limestone, which is a marginal facies of the salt.

Mining for potash beds within the salt series has furnished much detailed information of value, some of which throws light on the oil problems of North Germany.

The four main points treated of are:

1. Age of the salt.
2. The form of the domes and their tectonic relations to the surrounding sediments.
3. The mechanics of salt dome formation.
4. The influence of salt domes on the formation and concentration of petroleum.

These points are discussed as follows:

1—*Geological History.* The main salt deposits are Upper Permian (Zechstein). Above the salt is a very complete Triassic series, totalling some 3,000 feet, and showing alternating Continental and Marine facies. After a period of submergence, these were followed by Jurassic, Cretaceous and Tertiary beds, in fairly complete sequence in the northern part of the basin. The deposit probably total about 10,000 feet, and are principally marine sediments.

2—*Form of the domes and their tectonic relations to the surrounding sediments*—In the German basin there is a complete gradation from normal bedded salt beds to typical salt domes or plugs.

In Thuringia the salt is almost horizontal under thick Triassic deposits. Further north there are anticlines with a thickening of the salt along the crests. In Hannover there are true salt domes.

The salt domes of the Hannover region are divided into two types: *first*, those which have gradually uplifted the overlying beds and *second*, domes which have penetrated the overlying beds, as well as uplifting them somewhat. In the first type the overlying beds have usually been partially eroded and Upper Cretaceous or Tertiary beds are apt to directly rest on the salt mass as well as on the highly tilted Triassic rocks surrounding the salt. In the second type, the older rocks are not apt to be brought close to the surface.

Geophysical work indicates the presence of deep seated domes, with a cover of 4,500 feet or more. These are thought to probably be of the penetration type.

Examination of the internal structure of salt domes shows the same stratigraphic succession of the beds of the salt in a dome as occur in the horizontally lying salt beds. Thus proof is afforded that the German salt domes are merely intruded salt masses.

3—*Mechanics of salt dome formation*—The North German plain, in post-Zechstein times has been effected by two folding movements:

(a) Rhinish, giving rise to N-S lines.
(b) Saxon, giving rise to WNW-ESE lines.

There is a distinct tendency for the formation of salt domes along these lines of folding.

The thickness of beds overlying the salt is considered to be the governing factor as to whether the salt beds remain normal, or flow into salt dome masses. As the overlying beds increase in thickness, the tendency for the salt to flow is thought to be greater, and at some given depth, the change begins to take place from the uplift type of dome to the penetration type. No sharp change is thought to occur, and the approximate depth of overlying beds which give rise to this change is assumed to be around 6,000 feet.

This theory of the formation of domes by the weight of the overburden of rocks differs from that of Stille, who considers the domes to have been forced up by lateral pressure.

The main salt movement appears to have taken place between the Upper and Lower Cretaceous, and to have continued long afterward, and in certain cases is probably going on even today.

4—*Influence of salt domes on the formation and concentration of petroleum.* Theories that the salt masses, or waters associated with them may have had anything to do with the formation of oil are rejected. The salt domes are considered merely to have given rise to structures favorable for the concentration of oil. In support of this it is cited that although oil is known to be present in the Upper Triassic (Rhaetic) and up through the geological section, traces even being

Oil Production in Germany

	Total (Bbls.)	Wietze (Bbls.)	Nienhagen (Bbls.)	Oberg-Oelheim (Bbls.)
1921	287,917	256,657	23,370	7,237
1922	314,462	234,495	73,112	6,757
1923	380,775	255,435	114,060	10,890
1924	445,140	285,337	151,725	7,660
1925	593,475	296,452	204,667	7,897
1926	745,252	331,635	358,320	25,102
1927	726,622	351,495	338,625	36,502
1928	690,022	345,795	293,917	50,255
1929	778,485	361,695	323,097	83,692

1930, Total for all Germany, 1,209,185 bbl.

found in the Tertiary, no oil is considered to have been formed later than the Wealden (Lower Cretaceous). The main movements of the salt are thought to be post-Wealden, and if the oil were related to the formation of the salt masses there should be some evidence of the formation of oil in post-Wealden times. R. C.

▼

Other Salt Dome Papers

OTHER papers on the subject of salt formations and domes read at the London meeting include "Depositional and Deformational Problems" by G. M. Lees, who devoted his study to Persia, Iraq and Palestine. Mr. Lees stated that the oilfield of the Masjid-i-Sulaiman is a striking example of the strong structural disconformity between the intense surface folding of the Lower Fars and the broad simple anticline in the Asmari limestone. The greatest accumulations of salt and anhydrite occur both on the steep southwest flank and on the gentle northeast flank of the limestone structure, where a well was drilled to 5,822 ft. without reaching the limestone. The Cambrian salt domes of southern Persia are probably the most spectacular in the world. More than a hundred of them are known. They have an average diameter of three miles and form mountains 4,000 ft. high.

The salt dome area west of Celle in Germany was covered by an interesting paper by Dr. Carl Schmidt who pointed out that the salt dome of Wietze Steinforde is of special note, as at its northwestern corner the oil field of Wietze is situated where oil has been exploited since 1859. In fact, he claims that the first oil well in the world was drilled here in 1859, a little prior to the first well being drilled in the U. S. A.

Dr. Schmidt gave an additional paper dealing with geophysical investigations carried out in the salt dome areas of the Gulf Coast of Louisiana and Texas. He maintained that discovery of the Sugarland dome proved the importance of deep-seated salt domes, and that its exploitation furnished important data relating to the occurrence and oil potentialities of such deep-seated constructions. Of about 69 boreholes sunk on the Sugarland dome 66 are producing oil and one gas; and in 1930 this dome produced 4,000,000 bbl. of crude.

Frederick G. Clapp read a paper on the salt domes of Texas and Louisiana Gulf Coast. He pointed out that up to later than 1930 comparatively few salt domes had been discovered in the Gulf coast district, out of which less than a score were commercially productive of oil and gas. It was Capt. A. F. Lucas who discovered petroleum on salt domes, and in 1901 drilled a well at Spindletop, opening up a famous oil field. For many years wells drilled on salt domes were only moderately deep, but this class of fields has now entered the category of deep production. The production of petroleum from Gulf Coast salt domes in 1929 was 56,183,750 bbl., and the same year thirty new salt domes were discovered and fourteen new oilfields opened up in previously unproductive territory.

J. V. Harrison also gave a paper on salt domes in Persia. He discussed in detail examples of the different types of salt plugs now known in that country.

"Intrusive Salt Bodies in Coastal Asia, South Western Arabia," was the subject of a paper read by Arthur Wade, who stated that the close connection between salt domes and important accumulations of oil, particularly in the Gulf Coast of the United States, was creating a new and increasing interest in areas characterized by similar phenomena in the older parts of the world. He then discussed recent studies in the neighborhood of the Persian Gulf.

E. De Golyer covered the origin of the salt domes of the Gulf Coastal plain of the United States. He believes that cap rock, consisting chiefly of anhydrite and gypsum, is essentially a residue accumulating from materials originally deposited with the salt and left as a detrital deposit through the constant solution of the salt core by circulating waters. The oil deposits are of secondary origin and are controlled by the various forms of structural traps incidental to normal salt domes.

Launcelot Owen discussed the moot points in the salt dome field. He asserted that the research accomplished in the last five years has produced unfortunately very few satisfactory solutions.

▼

Iraq Pipeline Situation

LONDON, FEBRUARY.

DEVELOPMENTS in connection with Iraq oil are not likely to cause a flurry in any but French circles. Details of the pipe-line Convention signed between the British High Commissioner of Palestine and the Iraq Petroleum Company show that the latter has the right to construct a pipe-line through Palestine to Acre Bay. Full facilities are given to the Haifa Port authorities, but the company will be allowed to construct its own port. The concession will continue for a period of seventy years, after which the pipeline in Palestine territory becomes the property of the High Commissioner. Provision is also made for the protection of the property, employment of local labor and the remission of Customs duties.

These are normal provisions in an agreement of this kind; but another clause gives the Convention a rather Eastern appearance by providing that the company has three years in which to complete similar agreements with other countries through which the pipeline passes before the High Commissioner has the right to cancel the concession. The three years allowance appears to provide ample time for deliberate negotiations. There is, of course, every reason to suppose that any necessary agreements will take a much shorter time to complete, and considerable importance attaches to the presence of Sir John Cadman in the Mid-East when and immediately after the Convention was signed.

Sir John is chairman of the Anglo-Persian Oil Company, one of the interested companies, as well as of Iraq Petroleum itself, and although his associates in London deny that any significance should be attached to his tour, its coincidence with the completion of the Convention has caused considerable comment. The clause in the Convention relating to pipe-line agreements with other countries raises questions as to the areas concerned, in view of the decision regarding a double or branching pipe-line from Mosul to the coast with an additional outlet in French Tripoli. International exchanges between Britain and France on matters relating to Iraq oil developments are known to have been taking place during the past two months, and messages from Paris indicate that the French authorities are still hopeful of obtaining an outlet for Iraq oil in French territory. In fact the latest reports from Paris is that in an agreement between France and the British government, France will seek to construct her own pipe line to Tripoli, with a view to completion in eighteen months.

ALEC. H. DAY.

Taxes and Low Prices Jeopardizing Roumanian Oil Industry

BUCHAREST, FEBRUARY, 1931.

SUPERFICIALLY, internal and export prices of Roumanian petroleum products may not seem to justify an assertion that our industry is now fighting for its very life. It is only necessary, however, to take into consideration the taxes payable on those products to realize this assertion unfortunately is correct!

First taking into consideration internal prices, we have the following data:

	Prices in Lei IX.25.30	I.25.31	Taxes	Balance
Light motor spirit	13.50	8.00	6.60	1.40
Heavy motor spirit	8.00	4.00	2.50	1.50
Kerosene	5.60	1.80	1.37	0.43
Lubricating oil	4.00	1.90	1.60	0.30
Fuel oil	0.80	0.30	....	....

The collapse in internal prices was mainly due to the termination on January 1, 1931, of the Agreement for their regulation. What immediately strikes one is the disastrous proportional growth of taxes. As with normal prices the taxes were considered excessive, one consequently is at a loss to find an adequate word for them now. In addition, State royalties, Mining and Surface taxes, as well as all Commercial taxes payable by oil companies, are not included in the foregoing taxes.

Recently the Minister of Industry and Commerce realized the plight of the petroleum industry, and he has called a meeting of the oil company managers; but with the present state of public finance it is futile to look for a possibility of reduction of taxation on oil products. One wonders whether in the long run the revenue derived by the State from this item will not suffer more from this excessive taxation, than it would from an alleviation of the burden.

As far as export prices are concerned, transport and export taxes are also very heavy. Today such taxes represent the following proportion of export prices (F.O.B. Constanta): Light motor spirit 33 per cent, Heavy motor spirit 50 per cent, Kerosene 45 per cent, lubricating oil 50 per cent and fuel oil about 80 per cent.

Besides the above, the Roumanian oil industry has to overcome another obstacle, namely, that F.O.B. Constanta prices of Roumanian products are considerably below Gulf prices, as it is shown hereunder:

	Prices f. o. b. Mex. Gulf Cents per gallon	£ per ton	f. o. b. Constanta £ per ton	Difference + or —
Light motor spirit	6.125	4.11/5	3.8/0	—1.3/5
Heavy motor spirit	5.187	3.13/5	2.8/0	—1.5/5
Kerosene	4.375	2.17/9	1.9/0	—1.8/9
Lubricating oil	3.155	1.19/1	1.9/0	—0.10/1

It is obvious that under such adverse conditions, the position of the Roumanian oil industry becomes more precarious every day. It is doubtful that any company can make both ends meet. The whole situation can now be summed up in the two words "hold out." In the meantime the vitality of our industry is sapped, such reserves as still exist are being rapidly consumed. Half-hearted negotiations for the renewal of the Conservation Agreement and of the Internal Cartel are sporadically carried on, and apparently a *Deus ex machina* is expected to set things right again.

The Minister of Industry and Commerce is now preparing a bill for syndicating the entire Roumanian oil industry, which tends toward State control with a view to assisting the industry. There now exists in Roumania, as a matter of fact, a marked tendency towards widening the sphere of State monopoly. It is hoped, however, that the leaders of Roumanian oil industry will lift themselves out of the mire before the State uses its hand, which is likely to leave its heavy mark.

As far as prices of crude are concerned they are a truthful picture of the general state of things, Bustenari crude, the highest grade oil, quotes about 5,000 lei per tank car ($30, compared with $125 a year ago) while Moreni paraffin base oil is sold at about 2,500 lei per car of 10,000 Kgr. ($15, compared with $80 in January, 1930).

Production from Roumanian oil fields is maintained at about 2,000 cars per day, i.e., two-thirds of the output at the potentiality test in September, 1930. It is interesting to note that while the Moreni South Meotic sands seem to decrease in productivity, the new field of Bustenari is proving very prolific. The Astra Romana Company (Royal Dutch-Shell group) derive from that field a production of over 120 cars per day, each well giving from 10 to 45 cars per day from the Meotic formation.

Crude production in all Roumania for the month of January was 604,830 tons, or 4,233,810 bbl. at the conversion basis of 7 bbl. per ton used as an international standard by WORLD PETROLEUM.

E. L. MARGULIUS.

▼

Oil Struck in Italy

(From Our Own Correspondent)

ROME, Feb. 1.

AFTER two decades of intensive yet unsuccessful search for petroleum in Italian soil, a gusher yielding 175 gallons a minute has been found at Fonteviva, near Parma.

The oil was struck unexpectedly by workmen who were putting up a plant for collecting and utilizing natural gases long known to be abundant among the subsoils of that area.

If the first essays and quantity estimations are justified by continued results, the find is of great potential economic and political importance for Italy.

While sinking tubes for the gas shaft a yellowish liquid suddenly spurted up, engineers were called, and the liquid directed into improvised reservoirs. Tests showed the liquid to be petroleum of a very good quality.

The first few hundred gallons were collected amid scenes of great enthusiasm. Armed guards have been set up over the vicinity of the gusher.

▼

World Crude-Oil Production Figures—Official

January, 1931

(Conversion Basis. Barrels, 7 bbls.=1 ton)

Countries	Barrels
Total production	109,502,971
United States (A.P.I.)	64,900,000
All other countries	44,602,971
Venezuela (Estimate)	12,500,000
Russia and Sakhalin	12,072,900
*Roumania	4,200,000
†Dutch East Indies (Estimate)	3,226,854
Persia	3,201,156
Mexico	2,890,903
‡Colombia	1,657,694
Peru (Estimate)	975,000
Trinidad	821,523
Argentine (Estimate)	780,000
India-British (Estimate)	583,333
Poland	390,600
§Sarawak	326,956
Japan and Taiwan (Estimate)	197,500
#Egypt	196,021
Canada (Estimate)	165,000
*Ecuador	137,531
Germany (Estimate)	115,000
Iraq (Estimate)	100,000
Others (Estimate)	65,000

* Roumania; official provisional figures. WORLD PETROLEUM'S Roumanian correspondent gives the total as 4,233,810 bbl.

† Dutch East Indies; revised official figures for 1930 total is 38,722,250 bbl.

‡ Colombia; International Petroleum Company figures.

§ Sarawak; four weeks to Feb. 6.

Egypt; five weeks to Feb. 6.

* Ecuador; revised official total for 1930—1,596,238 bbl.

Where figures are not official, they are given as estimates.

International News and Reports

A GUSHER recently brought in at Kirvansker, Georgia, Russia, showed an initial production of 17,500 bbl. per day.

▼

An oil fluid has been obtained, says a report, from three holes of less than 1,000 feet depth, drilled near Petrusville, in the Orange Free State, South Africa,

▼

According to Louis Rollin, Minister of Commerce, the new French Petroleum Bill calls for the erection within one year of a State oil refinery capable of handling 2,100,000 bbl. of crude annually.

▼

Australia, which already has a customs duty of 14 cents per gallon on motor spirit, may add another three cents on all gasoline imported in bulk, with a view to preventing loss of employment in can plants.

▼

Fisher & Lowrie, geologists and petroleum engineers, First National Bank Bldg., Denver, Colorado, are very anxious to secure about 20 copies of the January 1930 issue of WORLD PETROLEUM. Will any reader desiring to dispose of his copy, kindly write to Fisher & Lowrie, as that issue of WORLD PETROLEUM is completely sold out.

▼

Commencing January 1931, the American Petroleum Institute has produced a quarterly review. It is published for members of the A. P. I., but others may subscribe at $4.00 per year. No advertisements or editorials will be carried. It will contain resumés of reports of the Institute's activities.

▼

The MANCHESTER GUARDIAN (England) refers to the efforts of the American oil industry to impose a tariff or embargo on Venezuelan oil as the "Goliath and David" and that Goliath, represented by America, is calling loudly for a shield bearer. The fact that conservation in America has not increased imports, but that imports actually declined by 2,000,000 in 1930 does not trouble the oil protectionists, says the British newspaper; and the sharp-shooting Davids of the Caribbean serve to justify the recruitment of a shield bearer for Goliath.

▼

France, in 1930, imported about 14,560,000 bbl. of motor spirit; 1,610,000 bbl. of lubricants; 1,365,000 bbl. kerosene; and 3,150,000 bbl. of crude oil.

▼

The Vaccum, Texas, and Royal Dutch-Shell interest operating in South Africa are likely to have strenuous competition from the Atlas Petroleum Products Company, which has contracted to market Russian gasoline and oils throughout the Transvaal and Orange Free State. A big storage plant is to be erected at Cape Town.

▼

C. S. Gulbenkian, the Armenian oil magnate, has received from the French government a permit to import 1,400,000 bbl. of crude per annum. This authorization he plans to assign to a refinery which will be constructed in France in the near future. Presumably Mr. Gulbenkian will control the refinery.

▼

It is expected that the new Colombian petroleum bill will be ready for the signature of President Olaya Herrera by March 10. Indications are that the bill as finally passed will not incorporate the changes recommended by American oil companies as being necessary to render oil exploitations practical and profitable. A copy of the bill is on file at the Editorial office of WORLD PETROLEUM.

▼

In the article on the Edeleanu kerosene plant in our February issue it was stated that no use has been found for the residue from the extract evaporators. We are advised however that the extract is high in aromatic hydrocarbons, which —after suitable treatment for sulphur removal — find extensive use as antiknock material by blending with lower boiling gasoline fractions.

▼

A concession to search for oil in Chile has been granted to Don José Ciceron Castillo, a Colombian, in the mountainous zone outside the Magallanes territory. Drilling must be started within one year. If oil is struck he will be repaid by the Chilean government who will acquire the wells. Meanwhile the government has drilled 4,000 ft. into oil sands at Tres Puentes. A German company is carrying out geophysical studies under contract in Southern Chile in the Magallanes territory.

Nationally owned refineries may be built in Chile, meanwhile a bill will be presented before the Chilian Congress calling for the use of locally manufactured alcohol in gasoline.

▼

It is rumored in European circles that one answer of the Royal Dutch-Shell to the proposed American embargo on South American petroleum is the offer said to have been made by Sir Henri Deterding to the German government of a loan of $150,000,000 for an oil monopoly so as to ensure a market for the "diverted" products. The oil industry of the United States at present does a big annual business with Germany. Sir Henri has issued a denial to the story.

▼

The island of Trinidad last year produced 9,419,804 bbl. of crude and a large quantity of refined products. The principal producer was the Apex (Trinidad) Oil Fields, Ltd. This company produced 425,036 tons (2,975,252 bbl.) of oil during its past fiscal year, making a new record in Trinidad. In the subsequent three months the rate of production has somewhat increased.

The company has 122 flowing wells, the total footage of the same being 245,840 feet, of which 39,407 feet were drilled in the past fiscal year. There was an increase in the footage drilled compared with the previous year, but the number of wells drilled was less, owing to their being deeper.

The Apex Company was formed 11 years ago, and up to the present time only $2,125,600 cash has been furnished by stockholders for working capital and all other purposes; yet $7,500,000 has been distributed in dividends, while undivided profit now exceeds $1,000,000. During the last three years over $500,000 has been written off respective to wells and operation, and all the wells now stand in the company's books at a little over $500,000; many of them being completely amortized although they are still producing satisfactorily. Because much of the profits not distributed in dividends has been used for production and development purposes, the directors are considering expanding the capital structure of the company so that encroachment upon profits will not continue.

U. S. PRODUCTION REVIEW

U. S. Production Review

	Daily Production bbl.	Daily Runs to Stills bbl.	Gasoline Stocks bbl.	IMPORTS Daily Total bbl.	IMPORTS Gasoline %
Week Ending Jan. 17...	2,080,247	2,218,300	40,384,000	245,571	19.4
Week Ending Jan. 24...	2,104,612	2,231,800	41,495,000	287,429	18.3
Week Ending Jan. 31...	2,079,080	2,217,400	41,657,000	195,857	2.9
Week Ending Feb. 7...	2,107,644	2,139,400	42,457,000	332,286	12.1
Week Ending Feb. 14...	2,130,258	2,211,300	42,859,000	206,714	16.9
Week Ending Feb. 21...	2,165,250	2,270,400	43,608,000	200,714	11.3

Underlined figures indicate improvement in statistical position:—decrease in production, runs to stills, gasoline stocks or imports.

U. S. A. Petroleum Figures for 1930

	Bbl.
Production (revised, U. S. Bureau of Mines)	896,265,000
Reduction from 1929	110,322,000
Crude Stocks on January 1st	512,797,000
Reduction from 1929	23,296,000
Runs of Crude to Stills	927,447,000
Reduction of Runs from 1929	60,261,000
Total Imports (crude and refined)	105,510,409
Reduction in Imports from 1929	3,054,528
Total Exports (crude and refined)	145,869,727
Reduction in Exports from 1929	6,901,760
Total Petroleum Consumption	923,085,000
Reduction from 1929	13,870,000
Production of Motor Spirit	441,534,000
Consumption of Motor Spirit	395,560,000
Increased Consumption over 1929	5 per cent
Motor Spirit Stocks on Hand on January 1st	43,261,000
Increase in Stocks over 1929	2,720,000
Motor Spirit Exports* (New High Record)	65,621,000

* Included in total exports.

Crude Oil Prices

THE Sinclair Refining Co. on February 13th made an offer to the Oklahoma City pool operators to purchase 50,000 bbl. of crude oil daily at 67c flat per barrel, this price being originally posted by the Champlin Refining Co. on December 29th, 1930. If the producers would have agreed to sell this additional amount of crude oil to the Sinclair Refining Co., the reduced price would have been followed by all other purchasers in the Oklahoma City field, and even though production would be 50,000 bbl. greater than it is at the present time, the cash value to producers would actually remain same (around $92,000). In other words it would mean that the producers would be presenting the refiners with 50,000 bbl. of crude oil daily. To the time of writing this review the Sinclair Refining Co.'s offer has not been accepted by producers.

In the Rusk-Gregg Counties of Northeast Texas there is no generally accepted posted price as yet. Most of the sales are made at from 35c to 40c per barrel at the well. The crude oil averages 40° Be, and is therefore selling 60c lower than some grades in Oklahoma.

Proration.

THE U. S. Federal Court in Guthrie, Oklahoma, held that there is no interstate commerce involved in the proration of the crude oil production, this decision being handed down on a petition of the Champlin Refining Company et al. against the State Authority to enforce proration.

In the Rusk-Gregg Counties of Northeast Texas a committee of 20 is to be appointed to draft a proration petition to the State Railroad Commission.

The most interesting development occurred in California, where after long court action to enforce the Gas Conservation Law, it was found to be ineffective to limit the crude oil production due to completion of two wells in the Kettleman Hills field with very low gas-oil ratio. The Petroleum Securities Co.'s No. 2 Felix was completed for 5,350 bbl. of crude oil and 5,400,000 cubic feet of gas, or 1,000 cubic feet per barrel; and the Superior Oil Co.'s No. 1 Huffman was completed for 11,200 bbl. of crude oil and 23,000,000 cubic feet of gas, or 2,000 cubic feet per barrel, thus not approaching the waste limitations of the Gas Conservation Law. The above small volume compares with as much as 50,000 cubic feet per barrel in the original wells of the Kettleman Hills field. At the present time there are 10 producers in the Kettleman Hills, of which 8 produce 26,880 bbl. of crude oil and 396,625,000 cubic feet of gas, or 14,750 cubic feet per barrel, and the two wells, already mentioned, produce 16,550 bbl. of crude oil and 28,400,000 cubic feet of gas, or 1,720 cubic feet per barrel. A new medium for enforcing the proration of crude oil production is now being sought.

Pipe Lines.

THE Standard Oil Company of New York approved plans for immediate construction of a gasoline pipe line from East Providence to Worcester and Springfield, Massachusetts, a distance of about 100 miles. The line is to be 6-inch, welded, of 5,000 bbl. capacity.

The Great Lakes Pipe Line Co.'s gasoline carrier from the Mid-Continent District (Oklahoma-Kansas) to Chicago and other Northern cities began deliveries early in February (See WORLD PETROLEUM, October, 1930, pp. 443-446).

Oklahoma—Oklahoma City.

THE Corporation Commission of Oklahoma allowed an increase in Oklahoma City Pool production from 90,000 bbl. to 125,000 bbl. per day.

New Mexico—Hobbs.

THE indicated potential production of this field reached 1,232,535 bbl. from 141 wells on 124 units of 40 acres each. The current allowance, is 31,353 bbl., or 2.54 per cent of the potential.

BASIL B. ZAVOICO.

▼

Oil Embargo—Tariff Position

JUST before we closed for press the situation on the oil embargo-tariff proposal was that it was intended to introduce a new bill into the House. Its terms would have limited importation of petroleum to 16,000,000 bbl. annually for two years, of which 6,000,000 bbl. could be refined before entry. After conferring with President Hoover on February 24, Senator Capper stated that he would press for action on the bill already reported by the Senate Committee on Commerce, which calls for three years embargo. Owing to the short time before Congress ends, it became doubtful if any oil bill could be passed. In fact all plans for an embargo or tariff were blocked by a resolution adopted by the Ways and Means Committee of the House on February 24 by a vote of 13 to 7. On February 25 all hopes of embargo legislation vanished when the Senate Finance Committee by a vote of eight to six decided to postpone indefinitely further consideration of the Kendall bill. This was followed on February 26 by the Ways and Means Committee of the House refusing to reconsider any embargo or tariff legislation in this Congress, even though a compromise of 54,000,000 bbl. was sought.

U. S. Soviet Russia Production Review

Shock Term October 1.—December 31, 1930.

ACCORDING to preliminary data of the Soviet oil industry the operations during the shock term consisted of the following figures:

	Prodtn. (bbls.)	Runs to Stills (bbls.)	Drilling (feet)
October	12,229,700	10,847,200	.....
November	12,262,600	9,798,600	.....
December	12,761,700	11,344,200	.....
Totals:	37,254,000	31,990,000	554,400

(Conversion basis, 7 bbl.=1 Ton)

The official plans called for:

Crude production	37,386,300 bbl.
Runs to stills	32,900,000 bbl.

Beginning from January 1st, 1931 the fiscal year has been set in harmony with the calendar year and following operations are reported of the oil industry for the month of January, 1931:

Crude production	12,072,900 bbls.
Runs to stills	10,399,200 bbls.

According to the schedule for this year, crude production must reach 178,500,000 bbl., or nearly 15,000,000 bbl. monthly, whereas during 1930 production averaged 10,827,951 bbl. per month, although each of the latter months showed a 4,000,000 bbl. increase over the earlier months. Runs to stills this year must total 154,000,000 bbl.

Capital Investment 1929/30

THE fiscal year 1929/30 ending Sept. 30, 1930 showed a total expenditure of 305,000,000 Roubles, as against the original appropriation of 352,700,000 Roubles, so the plan is 14 per cent in arrears. A summary of erection and reconstruction activities during the year show that expenditures in recent years fell short of the plans, and that 1930 was the worst year in this respect.

According to reports the arrears of the 1930 building plan are much greater than anticipated and also greater in volume than statistically indicated. Fear is being expressed as to whether the causes of delay in construction during the past year stand much chance of being eliminated in 1931, or even in 1932. The retarding of the building plan started in the summer of 1930 with the cutting down on imports of oil field and refinery equipment from other countries, while the home factories ordered to supply the oil industry were neither organized or equipped to handle the work.

This naturally resulted in the breakdown of the schedule. The building plans were consequently revised, and the oil trusts received permission to undertake all kinds of repairs of buildings and structures, using for this purpose funds originally allotted for the building of plants and their equipment. Expenditures were enlarged during the year for housing and communal buildings, highways and all kind of auxiliary enterprises, but the actual construction of plants was curtailed. Import lists were curtailed by two lubricating-oil plants; two pipe stills for secondary rectification; one plant for sulphur acid, as well as various electrical equipment. Contributory to the disorganization of the plan has been the complete lack of advance planning and projecting, which has also caused havoc in the schedule of operation of plants.

Rule of Thumb Construction

IT is reported that the entire system of refineries at Batoum had been erected virtually by rule of thumb without advance preparations of detailed designs, just in the same way as the greater part of construction work at Bacou, Grozny, and in the inner regions, were put up without advance designs and plans. Lack of plans in the oil industry has led to amusing experiences, which also proved costly. For instance the reports tell that there were buildings erected for refineries which were originally intended for locations hundreds of miles away. When cracking units were ready for operation it was found out that the necessary plants for secondary rectification had not been ordered at all. Manufacturer's blueprints or working drawings supplied with imported equipment were without reference to auxiliaries, which were to be of Russian design and manufacture. Naturally unfortunate delays occurred.

Almost all plants started in 1929 suffered from this condition, including the Badger stills at Batoum, the Max Miller bright stock plants at Bacou, the Foster Wheeler stills as well as the cracking units of Jenkins and Winkler Koch at Grozny, the Winkler Koch cracking units at Touapse and at Konstantinovka and so on; but of course, these manufacturers are in no way responsible. Prior to this there had been a shortage of labor, skilled and unskilled, followed by a lack of building materials, such as lumber, cement, pipe, etc. enhanced by the disorganization of transport and transport facilities.

Refinery Construction

THE total refining and cracking capacity in Russia under construction during 1930 amounted to 56,000,000 bbl. capacity, of which 19,950,000 bbl. are under erection at Bacou; 16,800,000 bbl. at Batoum; 15,400,000 bbl. at Grozny, and 4,200,000 bbl. at Touapse apart from treating plants and from the refining capacity under construction at Varinsk and Konstantinovka. Of the foregoing 7,000,000 bbl. were to begin operation in 1931, and the balance was scheduled for 1930. The actual capacity put in operation during the year amounted to 25,550,000 bbl. refining capacity, 5,250,000 bbl. of cracking capacity and 2,800,000 bbl. and consisted of 17,500,000 bbl. for the manufacture of lubricating oil. Considerable work has been done during the year on the Bacou-Batoum pipe line, which was completed for its full capacity. The reconstruction of the Grozny-Touapse line was delayed and plans are under way to include Maikop in this line, as it is contemplated to shift the refining of Maikop crude to Touapse.

▼

Punjab, India

OWING to a dwindling production, the Attock Oil Company's crude production in the Punjab district, India, in 1930 dropped to 191,247 bbl. from an output of 480,221 bbl. in 1929.

▼

Venezuela

IN the article entitled "Oil Development Costs in Venezuela" it was stated that the Creole Petroleum Corporation was drilling in the neighborhood of Barinas, capital of the state of Zamora. We are advised by C. C. McDermond of Maracaibo that it is not the Creole, but the Zamora-Venezuela Petroleum Corporation, a Sinclair subsidiary.

FINANCE

Paris

BUSINESS has not been brisk on the Paris oil share market during the past few weeks and the defeat of the Steeg Cabinet did not help matters. On the whole however, and although transactions were not numerous, a more optimistic atmosphere reigns, and most of the quoted shares have gained several points. It is almost unanimously believed that the Laval Ministry will remain in office for a few months at least, and this is one of the chief reasons for a brighter outlook here.

The price of gasoline has dropped again this month, but two new taxes have been proposed.

One of Frs. 10.—an hectoliter for the maintenance and the repairing of roads, and one of Frs. 32.—an hectoliter which is to take the place of the taxes paid up to date by motor cars. If these taxes are adopted by Parliament and are added to all those which already burden the industry, the cost of one hectoliter of gasoline works out as follows:

Price of gasoline (per hecto)	Frs. 41.27
Transport from the States	Frs. 5.25
Total	Frs. 46.52 or 1/4
Taxes and duty	Frs. 122.39 or 3/4
Total	Frs. 168.91 or 4/4

Is there any other commodity in the world which is taxed at three times its value? It seems hard to believe that there is, or that the public should accept such a situation.

PECHELBRONN S. A. E. M. already announces its industrial results for 1930. They show a noticeable increase over those of the preceding year.—Production from the Alsacian fields was 516,642 bbl. against 501,634 in 1929. The company's refinery has treated 763,623 bbl. of crude oil, as compared to 679,000 bbl., and the sale of refined products has increased by 10%. During the month of January Pechelbronn shares fluctuated somewhat violently and fell to Frs. 600.—(nominal value Frs. 500.—) they now stand fairly steady around Frs. 800.—Highest quotations in 1929 attained Frs. 1.309.

The Société Pechelbronn holds a unique position in France, being the only company to produce oil from national soil in any quantity. (The wells sunk by the State, with the help of Pechelbronn, near Gabian can hardly be taken into consideration.) The companies' chief occupation however is to refine the oil it produces, and that which it imports mostly from Colombia.

Pechelbronn is interested in many companies. It controls the Société des Huiles Antar; the Société Alsacienne des Carburants; the Compagnie des Transports Rhénane, and the Société Lyonnaise des Pétroles. It is a shareholder in the Cie Française des Pétroles; the Cie Générale pour la Navigation du Rhin; the S. Franco-Belge d'Entreposage de Pétrole, and has recently come to an agreement with the S. Brest-Port Pétrolier, a company which hopes to obtain an importing license and to build a refinery near Brest in due course.

AN Extraordinary Meeting of the shareholders of the S. A. Franco-Russe des Produits du Naphte "Petronaphte" was held in Paris on the 12th of January in order to authorize an increase of capital from 1 million francs to 10 million francs.

A first subscription of 3,000,000 frs. will be covered by assets in kind and the remaining 6 million francs will be subscribed by the S. Petrofina Française at the rate of 3,900 shares of Frs. 500 each, and by the S. des Produits du Naphte Russe with 8,100 shares of the same amount. Thus the above named companies hold 55% and 45% of the stock respectively.

Furthermore the Sté. Petrofina Française was authorized by a second meeting to turn over a terminal station it owns at Lyons, to the S. Petronaphte, in consideration for 6,000 shares of Frs. 500 proposed at the first meeting.

The S. Petronaphte was founded in 1928 by the S. Petrofina Française and the S. des Produits du Naptes Russe (representing Soviet interests in France) with a view to importing and distributing petroleum products in France, and more especially those of Russian origin.

A DEFICIT of Frs. 164,615 closed the S. des Pétroles de Bustenari's financial year on December the 31st. The chairman of the company laid special stress in his speech upon the fact that the increasingly difficult situation in Roumania had been the cause of this deficit. Whereas the average price of a tank-car load of oil in 1929 was Frs. 2,600, in 1930 during the 2nd half of the year it had dropped to Frs. 1,160.

A SOLUTION to the problems confronting the S. Malopolska may perhaps be found in a complete merger with the

Paris Bourse Prices

1930 Div.	1930 Price	Share	Jan. 6-Jan. 30 First	High	Low	Last	Change
50 lei	500 lei	Astra Romana	90	117	90	117	+ 27
....	500 lei	Colombia	67	88	46	88	+ 21
50 lei	500 lei	Concordia	66	91	66	91	+ 25
....	500 Fr.	Crédit Gén'l Des Pétroles act.	....	....	....	....	.....
....	.....	Crédit Gén'l Des Pétroles part	....	1,005	....	1,005	.....
....	500 Fr.	Franco Pol. Pétroles act.	50	69	49	....	.....
....	.....	Franco Pol. Pétroles part.	....	....	....	....	.....
1 $	10 $	Franco Wyoming	328	400	295	400	+ 72
20 Fr.	500 Fr.	S. G. Huiles Pétroles act.	396	405	370	397	+ 1
....	.....	S. G. Huiles Pétroles part.	132	145	128	145	+ 13
....	500 Fr.	C. F. des Pétroles	....	....	....	....	.....
50 Fr.	500 Fr.	C. Industrielle Pétroles	849	860	849	860	+ 11
65 Fr.	500 Fr.	Lille Bonnières Colombes prio	898	960	830	955	+ 57
40 Fr.	500 Fr.	Lille Bonnières Colombes ord.	620	680	605	680	+ 60
....	500 Fr.	Malopolska act.	....	70	50	60	.....
....	.....	Malopolska part	....	385	310	385	.....
....	.....	Mexican Eagle	....	60	49	60	.....
17.50	250 Fr.	Om. Inter. Pétroles	87	120	81	120	+ 33
50 Fr.	500 Fr.	Péchelbronn	730	820	600	815	+ 85
60 F. B.	500 F. B.	Pétrofina	460	580	460	580	+ 120
240 Fl.	1,000 Fl.	Royal Dutch	30,125	31,150	28,800	31,150	+1025
24 Fl.	100 Fl.	Royal Dutch 1/10	3,060	3,145	2,905	3,145	+ 85
5 sh.	1 lg.	Shell	449	475	445	475	+ 26
25 Fr.	500 Fr.	Steaua Française	135	153	121	153	+ 18

Credit General Des Petroles which already controls it. The total capital of both companies, amounting to 450 million francs, will, it appears, be reduced to 230 millions and the whole of the reserves written off for depreciation. After these transactions fresh capital will be called upon and debenture stocks issued for the purpose of paying off all creditors. A meeting of the French and foreign banks interested in these companies was held recently. In principal the proposal was accepted, but questions of detail are yet to be settled.

ALTHOUGH nothing official has yet been published with regard to the dividend of the S. Petrofina it is rumored that the usual sum of Frs. 60.—will be paid to shareholders. The results obtained by the company for the financial year ending on Dec. 31st appear to have been good in most countries, and more especially so in Italy. Petrofina has renewed its contracts for the coming year with the Soviets which cover a total of 2,400,000 bbl. gasoline for 1931 and 1932, as compared with 1,720,000 bbl. delivered the preceding years.

The chairman in his speech draws attention to the fact that in ten years time the companies' profits have increased from about Frs. 3,500,000 to Frs. 51,000,000.

E. J. ANDRE.

▼

London

OVERSEAS influences have again provided the dominant influence in the London oil share market. New York advices, and the fear that conservation might be endangered by the financial necessity of weak producers, together with the announcement of lower dividends by United States oil undertakings, produced an easy tendency a few weeks ago. Paris and Amsterdam have since become considerable buyers of Mexican and Canadian Eagles and the leaders of the Royal Dutch-Shell group, and the consequent rise in prices gave local bears a shock. Considerable recovery has thus taken place, with many shares at their highest for recent weeks and a general broadening of the market.

The price list as a whole makes an irregular showing although allowance must be made for the dividends deducted during the past month from several quotations. Mexican Eagles show the largest relative rise, the market having been assisted by the bringing in of the first well on the new El Plan area south of the Tonala field, as well as by the demand for the shares on French account. The Phoenix interim dividend accounts for the improvement in the shares. Attocks slumped heavily following the directors' statement on operations in 1930, and Trinidad Leaseholds have weakened on the issue of a disappointing progress report by Tocuyo Oilfields of Venezuela, in which the company has an interest. The Tocuyo company was registered in 1928, and its £1 shares stood at 15s. a year ago. The latest price is 2s. 6d.

BY the issue last month of £2,000,000 5 per cent debenture stock of London and National Property Company, the Royal Dutch-Shell group carried out a notable piece of indirect financing. London and National Property Company was registered at the end of January with a nominal capital of £1,000,000 in £1 shares and borrowing powers up to £3,000,000. Its first directors consist entirely of men associated with the group, including Lord Bearsted, chairman of the Shell Transport and Trading Company, and its objects include the holding of property and securities and the acquisition of the business of Burlington Investment Company, formerly used by Royal Dutch-Shell interests for real estate operations and the financing of subsidiaries. Last month's stock issue is a sequel to the purchase last year for Shell-Mex of the famous Hotel Cecil site between the Strand and the Embankment, London, for erecting a big office building and show room. With a first specific charge on the site, the new debenture stock was offered to the public at 99 per cent, and had an excellent reception.

MAINTENANCE of the Phoenix Oil and Transport Company's interim dividend for 1930 at 2½ per cent on the £1 shares was regarded as a favorable market factor, although the company's shares do not normally enjoy very great activity. For 1929 the total distribution was 5 per cent, paid in two equal instalments in January and July, 1930. Repetition of the dividend for 1930 was considered a little doubtful in view of the decline which took place in production during the latter part of the year in conformity with the Roumanian restriction arrangement. Output in 1929, however, showed a big increase, and the reduction effected in the second half of 1930 still leaves the total for the year at a record high level.

PROSPECTS of a share issue to bring the capital account into conformity with the company's strong position were unfolded to shareholders of Apex (Trinidad) Oilfields at the recent annual meeting. Eighty-seven per cent of all wells

London Stock Exchange Prices

1930 High	1930 Low	Last Year's Div. % per Ann.	Share	January 7 to February 7, 1931 First	High	Low	Last	Change
1 1/16	3/4	3 1/2	Anglo-Ecuadorian	17/32	9/16	17/32	9/16	+ 1/32
2 5/8	1 23/32	22 1/2	Anglo-Egyptian "B"	1 13/16	2 1/16	1 13/16	2 1/16	+ 1/4
4 23/32	2 5/8	20	Anglo-Persian	2 25/32	2 13/16†	2 11/16†	2 23/32†	— 1/16
1 13/32	9/16	25	Apex Trinidad (5s.)	19/32	5/8†	9/16†	9/16†	— 1/32
2	7/8	....	Attock	13/16	31/32	13/16	7/8	— 1/16
5/8	1/4	12 1/2	Brit. Borneo (10s.)	9/32	5/16	7/32	5/16	+ 1/32
11/16	5/16	6 3/4‡	Brit. Burmah (8s.)	7/32	7/32	7/32	7/32	.....
1/4	1/16	....	Brit. Controlled ($5)	1/16	3/32	1/16	1/16	.....
5/8	1/32	....	Brit. Controlled Pfd. ($5)	3/32	3/16	3/32	3/32	.....
4 31/32	3 9/32	30	Burmah	3 9/16	3 5/8	3 13/32	3 17/32	— 1/32
11/16	5/16	12c.	Canadian Eagle (No par)	11/32	7/16	5/16	7/16	+ 3/32
1 1/2	3/8	....	Creole Petrol. (No par)	11/16	11/16	21/32	21/32	— 1/32
5/16	3/8	....	Kern River (10s.)	3/32	3/32	3/32	3/32	.....
2 31/32	1 1/4	12 1/2	Lobitos	1 13/32	1 1/2	1 5/8	1 13/32	.....
3/4	5/16	6	Mexican Eagle ($4 Mex.)	3/8	1/2	3/8	1/2	+ 1/4
68	32	....	Pan American "B"($50)	34 1/2	36 1/2	34	34	— 1/2
11/16	5/16	5	Phoenix	11/32	3/8	11/32	3/8	+ 1/32
35 1/4	23 3/8	24	Royal Dutch (fl. 100)	24 3/4	25 1/4†	23 3/4†	25 1/4†	+ 1/2
4 31/32	3 17/32	25‡	Shell Transport	3 23/32	3 25/32†	3 9/16†	3 23/32†	+ 1/16
1/2	1/4	4	Steaua Romana	1/4	9/32	1/4	9/32	+ 1/32
3 3/4	1	7 1/2	Trinidad Leasehold	1 1/16	1 1/32	1 11/32	1 11/32	— 1/4
3/8	5/16	....	Utd. Brit. of Trinidad (6s.8d.)	1/4	9/32	1/4	9/32	+ 1/32
3 1/16	1 1/16	20	Venezuelan Oil Concessions	1 17/32	1 9/16	1 1/2	1 17/32	.....

Nominal value of shares £1 unless otherwise indicated by bracketed figures.
‡ Denotes tax-free dividend. † Denotes "ex-dividend" price.
c. Denotes cents per share

Accounts for 1930 which have just been issued show a gross profit of Frs. 57,528,477 (last year's balance of 2,763,291 is included in this sum). Net profit amounts to Frs. 50,821,385 against 40,956,284 during 1929, but this year 600,000 shares have to be remunerated in comparison with 400,000 the previous year. If a dividend of Frs. 60.—is paid there will be a balance of Frs. 10,312,671 to carry forward.

has already been written off, last year's record output was obtained from wells standing in the balance sheet at only £80,-407 and satisfactory output in still being achieved by some producers standing at "nil" in the books. Shareholders have nevertheless received handsome returns on their capital. Allowing for the share bonus of one in five distributed in 1927, dividends have averaged 32 per cent on the original capital for the eleven years of the company's existence.

ATTOCK OIL COMPANY has not yet made a success of its deep drilling policy. In a statement summarizing the position at the end of 1930 the directors announce that although results have been disappointing, expert advice from the company's concessions in the Punjab, India, indicates the existence of payable sands at depth. It is not anticipated, however, that appreciable results of the present drilling programme can be obtained for some months. Meanwhile the company's cash holding is stated to be higher than at the end of 1929.

In 1929 the output of 480,222 bbl. was a record, but no less than 66 per cent of it was obtained from two wells. The failure of shallow wells, and the self-plugging of a deeper well owing to gas pressure, underline the need for conservation of finances. Production for 1930 is officially stated at 191,249 bbl., a decline of approximately 289,000 barrels, and as Indian petrol and kerosene prices were reduced last October, financial results for the year to December 31 are not likely to be favorable.

THROUGHPUT and output of British refineries, extracted from the latest official figures, is shown below in thousands of Imperial gallons.

	1927	1928
	(000 omitted)	
Throughput:		
Petroleum	755,170	649,160
Shale oil	43,180	43,140
Output:		
Motor spirit	210,160	158,410
Other spirit	20,890	35,450
Kerosene	78,070	84,090
Gas oil	39,320	29,640
Lubricating oil	14,050	15,500
Fuel oil and Diesel oil	341,280	276,290
Other liquid products	560	1,130
Total liquid products	704,330	600,510

The decrease between the two years shown above does not indicate any tendency to permanent decline in British refinery activity. The tendency over a longer period would show considerable fluctuation between successive years, but with a gradual upward tendency.

THE relative importance of different petroleum products imported is shown from the following table, which also indicates the growth in consumption during recent years. Official statistics for last year are not yet available. Figures are given in thousands of Imperial gallons.

Product	1913	1922	1928	1929
		(000 omitted)		
Kerosene	157,141	152,537	190,604	255,032
Motor spirit	100,858	311,190	730,959	810,084
Other light prods.	.....	3	13,671	24,727
Lubricating oil	67,963	69,440	104,955	98,018
Gas oil	65,950	70,153	117,901	113,941
Fuel oil	95,062	392,618	451,402	405,611
Other mineral oils	24	33	128	595
Total liq. prods.	486,998	995,974	1,609,620	1,708,008

As might be expected, the most striking changes since 1913 are the advances shown in petrol imports, and to a smaller extent in fuel oil, in relation to kerosene, the increase in the latter being largely accounted for by normal increase in population.

A. H. DAY.

▼

New York

FOLLOWING a number of weeks of quiet strength the general market staged a more vigorous rally with sharply increased volume in the fore part of the week of February 14. The better tone in the market since the first of the year has been apparently in reflection of the seasonal upturn in such important indexes as automobile output and steel production and was made possible by the stronger technical position as indicated by a ratio of loans to total value of shares listed on the New York Stock Exchange of 3.30 per cent. Prior to the crash in 1929 this ratio was three times as great.

The oil shares, like the rest of the list, have been subject to opposing influences, and are now quoted somewhat above previous low levels. Favorable factors, such as the improving statistical position of gasoline and the Standard Oil of N. Y.-Vacuum merger decision, have been offset in part by disappointing earnings reports and dividend reductions, and by continued uncertainty in the crude oil division. The threat of important new production in East Texas, the agitation against present proration methods in Oklahoma, and the conflict of interests in the political campaign for limitation of imports and an oil tariff, are all rather unsettling influences in their relation to security prices.

A DECISION which may have far reaching importance in future developments in the American oil industry was

New York Stock Prices

1931 High	1931 Low	Current Div. $ per Annum	Stock	January 19 to February 14 Sales (Shares)	First	High	Low	Last	Net Change[1]
23¼	18	2.00	Atlantic Refining (25)	93,800	20⅝	23½	20	22¼	+1⅝
14¾	11¼	1.00	Barnsdall "A" (25)	61,000	12⅝	14⅜	11⅝	13⅝	+1⅛
2⅜	1½	....	Colon Oil (No)	9,300	1⅝	2⅜	1⅝	2⅛	+ ⅜
12	9¼	....	Continental Oil (No)	102,100	9⅝	12	9¾	10¾	+1⅛
3½	3½	....	Creole Petroleum (No)	9,400	3⅝	3½	3½	3¾	— ⅛
75½	63¾	1.50	Gulf Oil Corp. (25)	25,300	68½	73¾	66⅛	70	+2⅛
72	57⅝	2.00	Humble Oil & Ref. (25)	10,500	60½	72	60½	68	+ ⅛
18¼	17	†1.00	Imperial Oil, Ltd. (No)	10,400	17½	18¼	17	17	— ⅛
4⅝	3¾	....	Indian Refining (10)	89,100	3⅞	4⅝	3⅞	4½	+ ⅛
15½	13½	1.00	Internatio ıal Petr. (No)	47,800	14½	15½	13½	14½	— ⅛
18½	10⅝	....	Mexican Seaboard (No)	319,600	13½	18½	13⅝	17¾	+3⅛
19½	15⅝	1.00	Ohio Oil (No)	62,400	18	18¾	15⅝	17½	— ⅛
36½	32	....	Pan Amer. P. & T. B. (50)	2,600	35⅛	35½	33⅝	35	.....
16⅝	12¼	2.00	Phillips Petr. (No)	366,600	12½	15⅝	12¼	14½	+2
18⅞	12⅝	2.00	Prairie Oil & Gas (25)	25,700	14	15⅞	13½	15	+1⅝
11⅞	8¾	....	Pure Oil (25)	44,900	10⅜	11½	9½	10¾	+ ⅜
6¾	2¾	....	Richfield Oil (No)	173,700	4	5½	3¾	5	+1⅜
42⅝	37⅝	*3.20	Royal Dutch, (N.Y.) (13⅓)	18,700	38⅝	42⅝	38	41¾	+2
10¼	7⅝	....	Shell Union (No)	77,500	9⅜	10¼	9⅛	9⅝	+ ⅛
13½	10⅛	1.00	Sinclair Consol. (No)	133,900	11½	13½	11⅛	12⅞	+1⅜
12⅞	8½	....	Skelly Oil (25)	23,800	8⅝	11½	8½	10½	+1½
51¾	45½	*2.50	Standard Oil of Calif.(No)	71,900	46½	51¾	45½	50⅛	+3⅛
38¼	34⅞	2.00	Standard Oil, (Ind.) (25)	102,400	36	37¾	34⅝	34⅞	—1½
23⅝	20⅜	†1.80	Standard Oil, (Ky.) (10)	24,500	22½	23⅝	21⅞	23¼	+ ⅝
52	45¾	†2.00	Standard Oil, (N. J.) (25)	336,300	46¾	52	45¾	50⅛	+3¼
26	22½	1.60	Standard Oil of N. Y. (25)	125,100	23¾	26	22¾	25¼	+1⅝
45	39½	††1.00	Sun Oil (No)	3,000	40½	45	39¾	45	+5
36¼	30¼	3.00	Texas Corp. (25)	112,300	31¼	35½	31¼	34	+2¾
9	6½	0.60	Tide Water Assoc. (No)	50,000	7¼	8½	7¼	8	+ ⅝
26⅝	22	‡2.00	Union Oil of Calif. (25)	27,100	22⅞	26⅝	22¼	25½	+2½
69¾	52⅝	4.00	Vacuum Oil (25)	69,000	57½	69¾	53¼	65	+7⅜
1⅞	⅞	....	Venezuelan Petr. (5)	14,100	1¼	1¼	1	1	— ⅛

[1] Since close of last month's table. * Paid last year—no regular rate.
† Including extras. ‡ Plus 4% in stock. †† Plus 9% in stock. * Plus 2% in stock.

handed down February 9 at St. Louis by the United States Circuit Court of Appeals. Three judges acting in the case concurred in approval of the proposed merger of Standard Oil Company of New York and Vacuum Oil Company. They held that combination of these two former Standard Oil subsidiaries would not result in undue or unreasonable restraint of trade as contemplated in Section 1 of the Sherman Anti-Trust Act, nor in a monopolization within the meaning of Section 2 of this Act. Such merger is therefore held not in violation of that Act and not covered by the inhibitions of Section 6 of the Standard Oil Dissolution Decree of 1911. It is expected that the Government will carry the case to the U. S. Supreme Court, so that the present decision cannot yet be considered final even though it is so clear-cut as to make its upholding a not entirely unwarranted anticipation.

Considerable speculation has been aroused as to whether final approval by the highest Court would soon be followed by merger attempts on the part of other so-called Standard units. Thus far it appears that while disapproval of this case would prove a powerful deterrent to other efforts, its success would not assure approval in other cases but would merely offer encouragement to other combinations, each of which would have to be considered on its own merits.

The Socony - Vacuum combination would have combined assets of well over $900,000,000, and would rank as third or fourth in financial strength in the industry in this country. It would be sixth in volume of crude production and fourth or fifth in refining capacity.

STANDARD OIL COMPANY (Indiana) declared a quarterly dividend of 50 cents a share payable March 16 to holders of record February 16, placing the stock on a $2 annual basis against the $2.50 rate formerly paid. President Seubert said that while the company more than earned its dividend in 1930, the present disturbed situation in the oil industry necessitated a highly conservative policy as to paying out earnings.

It seems probable that the threat of serious limitation of imports through congressional action was given due consideration in the determination of dividend policy, since one of company's most important subsidiaries, Pan American Petroleum & Transport, is one of the three major Venezuelan producers and has recently completed a large refinery on the island of Aruba, Dutch West Indies. It is understood that this company and the Gulf interests are the most strongly opposed to proportional limitation of imports as now being urged upon Congress, while other companies having important foreign interests, such as Standard of New Jersey, would be less directly affected and are taking a more neutral attitude.

As predicted last month in these columns, further announcements of dividend reductions have been coming to hand and a few others are not unlikely. Atlantic Refining omitted its usual 25-cent quarterly extra, thus in effect reducing payments from a $2 annual basis to a $1 rate.

Standard Oil of Kansas reduced its rate from $2 annually to a $1 basis.

Standard Oil of Ohio dividend was cut to a $1 basis.

Standard Oil of Nebraska reduced its annual dividend rate from $2.50 to $2.

UNION OIL COMPANY of California reported net for 1930 after all charges of $9,604,997, a reduction of 36 per cent from the $15,019,635 earned in 1929. On a per share basis 1930 profits were $2.19, against $3.56 for the previous year. Largely because of inventory charge-offs the fourth quarter showed only about 35 cents a share in comparison with an average for the first three quarters of about 61 cents.

▼

Mexico Reduces Oil Export Taxes

MEXICO CITY.

THE Federal Government is urged to procure "direct benefits to Mexicans" from the petroleum industry, in resolutions adopted by the First Congress of National Economy during its sessions in Mexico City. The Congress was the first of its kind to be convened in Mexico. It was called by the Government as a means of ascertaining ways and means of dealing with the prevailing economic depression. The conference was attended by representatives of leading industrial, commercial, agricultural, and other enterprises in the Republic. Pertinent points of the resolutions are as follows:

"To procure in the industries, and among them that of petroleum, a direct benefit to Mexicans, more than the indirect benefit he could get from an increase in the importation taxes. To that effect, concessions must not be given to foreigners gratuitously, but by an exchange of shares by the company (which obtains the concession). These shares will be put on the market opportunely by the Government, and they will not be transferable to foreigners. In the event of the concession being given to Mexicans, it will be gratis, but only upon the condition that they form an anonymous Society, and that 51 per cent of its shares which must be nominative, are not transferable to foreigners.

"To work actively in order to prevent a protectionist tariff for the importation of petroleum and its by-products from being enacted, as that would have the immediate effect of increasing the prices of those products which would prejudice national industry.

"To work in an effort to have the gasoline consumption tax reduced from six centavos (about three cents) to four centavos per liter, and that this tax be used strictly and exclusively for the construction of roads.

"To insist upon cheaper railroad freight rates for petroleum."

WITH the object of increasing the exportation of mineral combustibles produced in the country, the Government has decreed a modification of the exportation levies of those products.

Petroleum and its by-products (By cubic meter, at a temperature of 20 degrees, centigrade):

	Present Quota (Pesos)	New Quota (Pesos)
Crude, when its density is 0.96, or less	1.00	1.00
Crude, with density of more than 0.96	0.62	0.62
Fuel oil	0.80	0.75
Gas oil	1.86	1.00
Crude gasoline	3.76	2.50
Refined gasoline	1.88	1.00
Crude kerosene	1.20	0.80
Refined kerosene	0.60	0.30
Lubricants	1.12	0.75

As the Mexican Eagle Oil Co. (subsidiary of the Royal Dutch-Shell) proposes to considerably reduce its activities in the near future, the directors of the Company have invited the workers to cooperate with suggestions as to how best to make the necessary labor readjustments. It is expected that thousands of workers will be discharged. Although the Company has offered to compensate each dismissed employee with one month's pay for each year of service, in addition to the three months' salary provided by law. DOUGLAS GRAHAME.

The Foreign Oil Legion

H. R.H., the Prince of Wales, and his brother Prince George last month visited the oil fields at Talara, Peru.

▼

H. D. GELDER, sales-manager, Caribbean Petroleum Company has been transferred to the Caracas office of the company.

▼

A. E. PHINNEY has been appointed sales manager of the Caribbean Petroleum Company of Maracaibo, Venezuela.

▼

R. G. STEWART, president, Pan-American Petroleum & Transport Company sailed from New York for Europe on February 6th for a trip of about six weeks.

▼

J. OPPENTOGH, resident engineer of the V.O.C., at Cabimas, Venezuela has gone to Switzerland for his vacation.

▼

J. D. SCHROEDER, South American representative of the Guiberson Corporation; Parkersburg Rig & Reel Company; Reed Roller Bit Company; and Martin Decker Corporation, recently arrived in New York. After visiting Texas and California Mr. Schroeder will return to Venezuela.

▼

A. C. DUNTHORNE, engineer for the Whessoe Foundry & Engineering Company, Ltd., Darlington, England, is spending a few weeks in Cleveland, Ohio, consulting with officials and engineers of Arthur G. McKee & Co., refinery engineers and contractors. The Whessoe Co. recently became exclusive manufacturing agent in Great Britain for the manufacture of McKee oil refinery and blast furnace equipment.

H. J. Struth

Photo by Bachrach

▼

H. B. GREER, manager of operations at Maracaibo, for the Venezuelan Sun Oil Company has just returned to the United States. His new home will be located at Fairview Ranch, Pipe Creek, Texas.

▼

L. C. QUACKENBUSH, general sales manager, Tide Water Oil Corp., is on a business trip through England and France studying petroleum markets.

▼

"Pete" Fletcher,

V. G. O. production superintendent at Cabimas, Venezuela.

▼

H. J. STRUTH, petroleum economist on the staff of THE OIL WEEKLY, Houston, Texas, member of the Central Proration Committee of Texas Oil Producers, has been honored by the American Institute of Mining and Metallurgical Engineers with election to the Chairmanship of the Committee on Petroleum Economics, succeeding J. Elmer Thomas, of Fort Worth, Texas. Mr. Struth presented a paper on Gasoline Economics before the Institute, at the annual meeting of that organization, held in New York, February 16 to 19. The paper was well received.

▼

E. J. SADLER, president, Creole Petroleum Corporation, and T. A. Armstrong, vice-president, used the Pan-American air routes to make a rapid trip from the Venezuelan oil fields to Colombia, together with C. J. Lieb, general manager at Purta de Leiva. For flying in Venezuela the company has two Sikorsky planes of its own, which the party used for a visit to the Dabajuro and Rio Seco fields, to Caracas, and to Maturin in Eastern Venezuela. Mr. Sadler returned to New York at the end of the second week in February, and Mr. Armstrong followed about ten days later.

E. J. Sadler,

President, Creole Petroleum Co.

Photo by Blank & Stoller

▼

J. A. E. MAY, branch manager of the Anglo-Persian Oil Company at Hamadon, has been enjoying a well-earned vacation.

▼

H. DUNDAS, who handles many of the overseas business affairs of the Standard Oil Company of New York, is now travelling in India.

▼

T. L. JACKS, resident director at Teheran, Persia, of the Anglo-Persian Oil Company, was recently in London.

▼

J. F. NEW recently was presented with a gold cigarette case by Sir John Cadman, as a reward for 30 years' service with the Anglo-Persian oil group.

▼

E. W. SHAW, chief-geologist of the Iraq Petroleum Company has been visiting New York. His work in Iraq must have been fairly accurate as the company has drilled 21 wells, many of about 100,000 bbl. per day each, in the Babu Gurgur field, in addition to a limited number of non-productive wells.

Dr. E. W. Shaw,

Chief geologist Iraq Petroleum Company.

SHIPPING

London:

LLOYD'S annual summary of mercantile shipbuilding of the world makes interesting reading as far as tanker construction is concerned. Tankers in 1914 totalled less than a quarter million tons. Today they amount to over eight million tons. During the past year 119 tankers (of 1,000 tons gross and upwards) were launched, aggregating 889,865 tons gross register, as compared with 324,870 tons in 1929 and 646,851 tons in 1928. Of the 119 vessels built in 1930, as many as 101 of 778,854 tons were Diesel vessels. There also were launched 40 small tankers totaling 18,469 tons, thus making a grand total of 908,434 tons, or approximately 1,400,000 tons deadweight.

These record figures represent nearly 31½ per cent of the total world new tonnage for 1930, and give some indication of the way in which tanker fleets have increased in the last twelve months. For 90 of the vessels aggregating about 710,000 tons the Isherwood system of longitudinal framing was used.

As far as Great Britain's bulk oil carriers are concerned, nine steamers of 39,684 tons and 68 motorships of 510,791 tons were put into the water. These totals include 28 vessels built for registration in Great Britain, 39 for Norwegian owners and 10 for other countries. Including 13 small vessels of 4,809 tons the total tanker tonnage launched in Great Britain amounted to 555,284 tons and represented over 37½ per cent of the total output for the year 1930. Not only are these figures much higher than any previously recorded but they show that only 7.2 per cent of the total tanker tonnage was steam propelled and all these steam tankers, of course, used oil fuel for the boilers.

In the United States, including ships of 1,000 tons and upwards, 13 tankers of 104,674 tons were launched, seven of which of 55,536 tons were motor vessels. In Germany nine tankers of 86,977 tons were launched, only one of which of 9,100 tons was a steamer. In Holland three motorships of 18,093 tons and one steamer of 5,209 tons of tanker type were launched. Japan launched one tanker of 7,280 tons. Japan is also building one of the largest and certainly the fastest tankers in the world. She is owned by the Iino Steamship Co., is of 12,500 tons deadweight and is a single-screw ship of a 14½ knots service speed, her dimensions being 440 ft. x 65 ft. x 37 ft. Sweden put into the water nine tankers, all motorships, of 69,082 tons gross. France's one contribution to the tanker fleet was a steamer of 7,880 tons, while Italy launched two tankers of 19,070 tons, the larger being the J. A. MOWINCKEL of 11,330 tons for Standard Oil interests.

Launches, Trial Trips, and New Contracts

IT will be seen then from what has gone before that the year 1930 was easily a record year for tanker completions and there are still many important vessels finishing off. The British Tanker Co., which carries all the oil for Anglo-Persian, took delivery of the BRITISH SCIENCE early in February. This is the first of three vessels of about 10,300 tons deadweight, which Palmers have in hand. The 13,800 toner BARFONN is a dual purpose ship in that she has been built for carrying dirty as well as clean oil cargoes. She has two Götaverken-B. & W. Diesels for propulsion, developing a total of 4500 h.p., giving her a service speed of about 11½ knots.

Among other important tankers now fitting out is the PERMIAN, the second of the two Diesel-electric ships building at Scott's yard for the Atlantic Refining Co. This ship is similar to the WINKLER completed recently, but is somewhat larger. The international nature of this ship was pointed out at the launching ceremony when it was recalled that the shell plates came from Czecho-Slovakia, the engines—American designed—from Belgium, part of the auxiliary machinery from the United States and the main electric motors from England; she was constructed by Scottish workmen for American owners, sailed under the Panama flag and will be navigated by Norwegian sailors.

The PERMIAN has been designed to carry 14,200 tons of motor spirit on a light draft. Her gross tonnage is about 9,000 tons, she has a length of 469 ft., a beam of 63 ft., and a depth of 36¾ ft. She is the eleventh vessel of her owners to have Diesel-electric propulsion, and the prime movers are the same as those fitted in the WINKLER and BRUNSWICK, consisting of four single-acting Ingersoll-Rand oil engines each coupled direct to a main and auxiliary electric generator.

British shipyards are still engaged in finishing off some of the orders for hulls which were subcontracted to them from the busy Swedish shipyard at Gothenburg. The unfortunate part about these completions from the shipbuilder's point of view is that little new tonnage of note is coming along to take its place. The rumor of a large tanker for the Argentine Government has entirely fallen through owing to difficulties of financial arrangements. Mention may be made of the fact that a contract is likely to be placed shortly by the National Benzole Co. for a coastwise tanker to operate along the British coasts; The Furness shipyard has been fortunate enough to secure an order for two ships, which are replicas of vessels built by them for the Imperial Oil Co. for service on the Great Lakes. It is worth placing on record that the order for these ships came over the transatlantic telephone, this being probably the first case in which a pair of vessels has been ordered by telephone.

Charter Market

ACCORDING to latest advices, the charter market still remains dull, few fixtures of any importance having been made. As far as clean oils are concerned, February-March loading took a part cargo of 6,000 tons from Trinidad to U. K. at 9/-. A parcel of about 6,000 tons was also fixed Constantza to two ports East Coast U. K. at 8/-, whilst a vessel of about 7,500 tons from Palembang to U. K. Continent accepted about 19/-. The new creosote-carrying tanker ADELLEN which, incidentally, was in trouble recently through collision with Tampico harbor breakwaters was fixed in January Tampico and U. K. Continent B/H for 9/3d. for crude oil. A dark oil vessel was fixed for February loading for the carriage of about 6,000 tons of vegetable oil from Black Sea to U. K. Continent at 11/6d. The Time Charter market during the last few weeks has shown an almost entire absence of any enquiry, and this fact will account for the laying up of a few new tankers immediately they have left their builders' Yards.

A. C. HARDY.

New Equipment and Engineering Information

Gas Saturation Controller

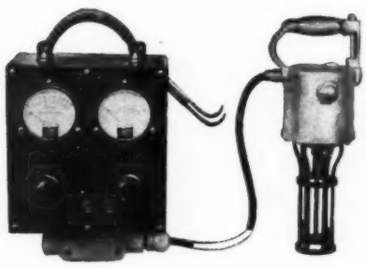
THE Foxboro Company announce a new instrument for controlling gas saturation. It is known as a saturation controller, and is designed to keep natural gas saturated in such a way as to prevent drying out and subsequent leakage in gas lines. The operating principle is practically that of a wet and dry bulb psychrometer so constructed as to keep the gas constantly saturated at the gas-line temperature, thus avoiding both leakage and condensation troubles. A full description of the instrument, illustrated by very clear drawings, is contained in the Foxboro Company's bulletin D. M. F. No. 589.

Another Viscosimeter

INNUMERABLE viscosimeters using various principles have been invented, and each new one seems to offer some novelty or convenience not possessed by its predecessors. One of the latest of such instruments is the De Vilbiss electric viscosimeter, which has been developed by the De Vilbiss Co.

The De Vilbiss viscosimeter measures viscosity by rotating an impeller immersed in the liquid under standard electrical conditions. It shows liquid consistency as a dial reading, just as the ammeter on the dash of an automobile indicates the rate at which the battery is being charged; no special container for the sample is needed.

In operation, an attachment plug is connected to any light socket and the instrument connected with the line by means of a snap switch. The potential on the circuit is adjusted to a definite value by means of a control dial, and the impeller is then submerged in the liquid. The push button on the handle of the impeller mechanism is depressed and the consistency of the liquid is simply read from the viscosimeter dial.



The results are accurate within two per cent, and may be converted into Sayboldt or Engler units by reference to a chart.

Explosion-Proof Starter

THE Louis Allis Co. has just put out what is described as the first air-break "explosion-proof" motor starter ever to be developed, and which is a fit companion to the Louis Allis explosion-proof motor, which also was the first of its kind. Both starter and motor have been exhaustively tested by Underwriters' Laboratories, who have passed them for use in "Class I, Group D" hazardous locations such as oil refineries, natural gas establishments and similar localities. Flame cannot escape from either starter or motor. The revolutionary feature which distinguishes the Louis Allis starter is the elimination of oil immersion, which cannot be depended on for absolute safety. Sales have already proved the existence of a large demand for such a starter.

Variable Speed Transmission

A NOVEL type of speed regulator, (P. I. V.) claimed to be the first all-metal variable speed transmission on the market, is announced by the Link-Belt Company. Basically, this new speed change unit consists of two pairs of wheels of the opposed conical disc type, between which

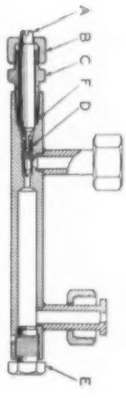
a unique chain transmits power. The effective diameters of each pair of wheels can be altered under load to change the speed ratio, without steps and without dependence upon friction. On changing speed, the self-pitching chain rises in one set of wheels and descends in the other, so that while the input shaft connected to a motor or other source of power turns at constant speed, the output shaft is brought to the desired R.P.M. The wholly original feature of the P.I.V. gear is its use of a positive chain drive to transmit the power. Radial teeth are cut out in the conical faces of the driving discs, and the self-adjustable teeth projecting beyond the sides of the chain are arranged to positively engage the radial teeth of the discs.

The Versatile Caterpillar

"PIPE lines and the Caterpillar" is the interesting subject of a booklet issued by Caterpillar Tractor Co., with 38 fine illustrations exhibiting the work which caterpillar tractors perform in constructing oil and gas pipe lines.

New Damping U-Tube

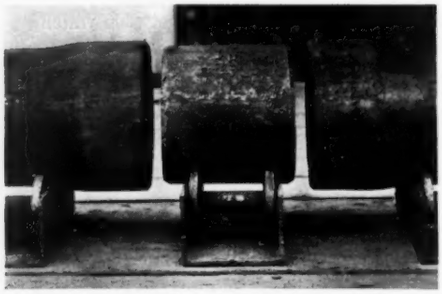
A NEW damping U-tube has been perfected recently by the Foxboro Company for use on all their new style flow motors and flow controllers. This U-tube can be adjusted for proper damping while the instrument is in operation. There is no need of shutting the pressure off or taking the instrument apart in order to make this adjustment.



In the figure shown here A is a "screw-driver" which is fitted to the end of needle

valve D. By turning A, adjustments can be made in the damping without the mercury being forced out. These adjustments can be made very minute or very large as conditions warrant.

Fig. 1

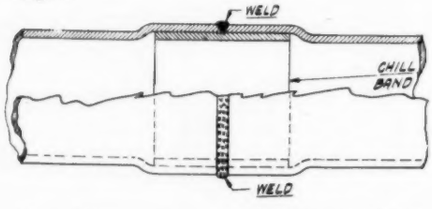


Latest in Pipe-Lines

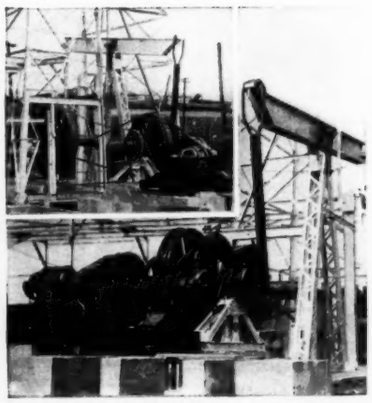
THE recently completed ten-inch Gulf pipe line between Perryman, Oklahoma, and Spencerville, Ohio, 732 miles in length, exemplifies the latest developments in efficient pipe-line construction. The distinctive feature of this pipe-line job is the use of lap-welded standard pipe equipped with a bell at the end of each pipe length, into which is inserted a chill band. The components of each joint are shown in Fig. 1, ready for assembling in the manner indicated in Fig. 2. The completed joint is shown in Fig. 3. This method of construction insures a welded joint of exceptional strength. The pipe lengths averaged 40 feet in length, and weighed 40 lbs. per linear foot.

Prior to embarking on the construction of this line, a series of tests were made to determine the weld to be used. This study resulted in the adoption of the "Fleetweld" process, which utilizes the shielded arc, a recent development of the Lincoln Electric Co. In this process the welds are made in an atmosphere

Fig. 2



free from oxygen or nitrogen, thus avoiding weakening of the iron by oxides or nitrides. In a number of cases the operators were able to make more than 50 welds in a nine-hour day. After completion the line stood up when tested in sections of from 78 to 193 miles under air pressures of 100 to 130 lbs.



Chain-Driven Rig Front

AN unusually flexible chain-driven rig front has been put out by the Parkersburg Rig and Reel Co. It is mounted on a regular band wheel shaft to handle all phases of modern well operations. Special features are self-aligning roller bearings on the crankshaft and counter shaft. Bull wheel, calf wheel and sand rig are optional and the rig front may be installed with any standard sized derrick. The unit may be driven by electric motor, reverse gear gas engine or steam engine.

Fluid Packed Pumps

A LARGE part of the Polish production is now being obtained by swabbing, pumping having been unsuccessful heretofore due to the extremely high paraffine content of the oil. The Fluid

Fig. 3

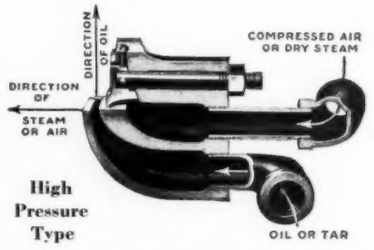
Packed Pump Company, however, was able to demonstrate that these wells could be pumped satisfactorily.

The Fluid Packed Pump Company has entered into a contract with "Malopolska," a large holding company controlling more than 50 per cent of the production of Poland, by the terms of which this large operator will stock and distribute fluid packed pumps. A similar agreement has been made with the Soc. "Apex" S. A., for the Roumanian fields,

Flame fits firebox

USING

W. N. BEST Oil Burners



The W. N. BEST Oil Burner is filed, fitted and tested to insure proper flame performance for each application. There are no internal parts or needle points to clog, and the burner is always clean. Regulation of the flame is very simple and assures great economy in operation.

W. N. BEST oil burners are especially adapted for the firing of boilers and stills and will use the heaviest of fuel oil, tars, still bottoms or residues without clogging or frequent cleaning.

Catalog sent upon request.

W. N. BEST Corporation

Engineers and Manufacturers since 1890

291 Fifth Ave. **New York, N. Y.**